The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Government Planning in Industry

FOR good or ill we have entered a new industrial era. It is marked by the end of the go-as-you-please procedure of the first 150 years of the industrial revolution, and its replacement by organised planning in which the individual must partly or wholly subordinate his opinions and actions to the will of the Government. The success or failure of industry will clearly depend as much upon actions taken by the Government as upon the initiative and skill of the individual. While we are about it, we may as well plan to the best of our ability, and it is worth while considering here what should be the guiding principles.

The system of individual competition between firms great and small resulted in powerful influences towards efficiency and invention. Many fell by the wayside since they could not keep up the pace. Some, favoured by the presence in their ranks of men of genius, prospered exceedingly. But the writing has been on the wall for many years past. The events that took place in industry before the war of 1914-18 may have faded from memory, but we should remind ourselves that they comprised a series of trade depressions and booms that caused insecurity of employment for the individual and considerable anxiety for the employer. These influences were intensified after that war, and steps were taken to reduce the fluctuations. Those steps were the organisation of industry in cartels or other kinds of association with the purpose of avoiding forms of competition that could have no other result than price-cutting and disaster. Not everyone agrees that cartels were the right answer, and there are many to-day who strongly disapprove of cartels and price-fixing associations. So far as can be seen, however, there was nothing equally effective to put in their place. They served a useful purpose when properly conducted; but it may well be that the answer to the cartel is planning of a different type. It is certain that any form of cartel will in the future be controlled by Governments so that it shall not operate injuriously to the consumer. This, however, is not enough. We must be sure that the cartel operates in such a way as to promote the best practice, technically and economically. The condition of national survival is industrial efficiency.

An example of bad cartelisation is provided by our war methods. Here the need was for high production over a short period, irrespective of costs. We wanted many things in large

On Other Pages

quantity, and while some firms were equipped to produce them, others were not. Often the well-equipped firms could produce at prices that others could not touch. It was important to avoid inflation, and so the simple expedient of fixing prices sufficiently high to allow everyone to make a profit was ruled out. Instead, a method of cartelisation was introduced by which those who produced at high cost were subsidised by a levy extracted from the efficient low-cost producers. That procedure served its purpose during the war. It might even have been defensible as a temporary measure before the war. It will not serve us now.

What, then, must be our basic principle in planning? Is not the self-evident answer that it must be to secure the best use of our resources by every means available? That answer, however, is not so simple as it seems at first sight. It means, of course, that industry must be technically efficient. Many British industries lag far behind their counterparts in the U.S.A. in production per man-hour. One of the basic conditions of our industrial recovery must be to raise productivity per man-hour to the levels secured by other nations. Labour is asking for shorter hours and higher wages. They can only be granted if production per man-hour justifies it. A task of the Government is to prepare the way for this by persuading Labour that the law of Adam still stands: In the sweat of thy brow shalt thou eat. To make the best use of our labour force is the first step towards industrial efficiency.

The second step must be to produce at the lowest cost. It has been pointed out recently that there is great need for accurate data regarding costs and prices in industry, and that it must be a function of Government to produce those data. They must, however, be real data and not obscured by subsidies, taxation, and other influences which keep prices artificial. Where, for example, a subsidy reduces raw material prices, either generally or in a particular works or locality, this subsidy must itself be included as a cost. Without knowledge of basic undoctored economic data, it is impossible to make the right decisions. Let us see to it that we base our planning on the fullest and most open recognition of the real comparative costs of alternative enterprises, unconcealed by any protecting devices, however necessary these may be in themselves. We cannot afford in the long run to keep up uneconomic enterprises for the sake of avoiding unemployment, or to maintain a population in a particular locality. Processes may change, demands for goods may change, new discoveries may render old-established enterprises out of date, and we must be prepared to change with the times. Industry naturally tends to be static; there are many who cannot view with equanimity the passing of the old order, but for the future industry must be dynamic. It must be prepared to site itself wherever the relation between costs, availability of raw materials, transport charges, and markets enables production to be conducted most cheaply—and the population must be prepared to move with industry.

That view of planning will not be popular, but it is a consequence of the new order thrown up by the war. As a writer has put it: "It is not the least task of public policy to-day to achieve security and stability without either conceding privileges to the old and established sectional interests or, as happened between the wars, attempting to prevent fluctuations by restricting output or impeding change." Thus it has come about that the Government's task must be to guide industry to make the right decisions and to create the background against which those decisions can be taken with certainty and carried through ruthlessly. The nation has called for total employment, it has asked for social security; it cannot have these under the old method of free competition.

Whether we shall be any better off is another matter, but clearly we are entering a new era. The nationalisation move is only one of the symptoms of this new age. No longer is it considered right that a man should take his own decisions and arrange his business as he thinks fit. The distribution of income and the total income itself are from now on considered to be the business of the nation. We should not blame the Labour Government for this change. In our view it is the inevitable accompaniment of our entry into the Age of Science. Scientific men have long argued—and rightly—that to use our natural resources wastefully, as we have done throughout the whole of our industrial history, is wrong and indefensible. On every side we hear it declared that science is a good servant, but that we must not let it rule us. That is bunk. Science rules us now, and will continue to do so, whether we like it or not.

NOTES AND COMMENTS

The A.Sc.W. "Graduates"

REALLY the outstanding feature of the conference on Science and the Welfare of Mankind held at Beaver Hall, London, last week-end, was the emergence of the Association of Scientific Workers to overt recognition as one of the leading scientific institutions in Britain. In point of fact it has occupied a prominent position in the world of science for some years, but "official" acknowledgment of its status may be said to have been finally given by the fact that the president of the Royal Society, the senior scientific body in Britain, took the chair at the opening session of the conference. Were further confirmation needed, it would have been supplied by the contribution of Professor A. V. Hill and Sir Alfred Egerton, two of the Royal Society's secretaries, to later sessions, not to mention the first speech on science made by Dr. Julian Huxley since his appointment as executive secretary to Unesco. The A.Sc.W. has advanced a long way since it was a struggling body of some 2000-3000 members, rather frowned upon by many established and orthodox scientists as being a turbulent left-wing body concerned with little more than securing higher wages for its members. Honest hard work and good organisation have removed this misconception, and there are few scientists to-day who are not ready to acknowledge that the Association, so far from being merely sectional, is working for the good of scientists and science as a whole.

Co-ordination the Keynote

THE keynote of the conference was set by the chairman, Sir Robert Robinson, who referred to the world-wide collaboration in research during war time, which had enabled tremendous advances to be made in the applications of penicillin, radar, and nuclear energy. He asked why scientific research in peace could not be similarly co-ordinated. Mr. Herbert Morrison urged that the world needed more widespread scientific thought among men in every field of human endeavour and said there was an urgent need of the help of scientists in industry. Close co-operation was likewise the theme of subsequent speakers, including Dr. T'U. Chang-Wang, who pointed out that the fact that it took him only five days to fly from China to England meant that spiritually and physically the world had been closely knit together by science into an organic whole. The primary object of the conference was not the formulation of policy, but to provide scientists and scientific workers with an opportunity of "thinking aloud." Altogether, the conference was an even greater success than the organisers hoped, so much so that they are now understood to be turning their thoughts to a further conference, on "Education."

A Lecturer with Humour

WHEN Mr. R. E. Threlfall delivered his lecture on glass tubing to the London Section of the B.A.C. last week (as reported elsewhere in this issue) he confessed it was the first occasion on which he had addressed a scientific body. We venture to prophesy, however, that it will not be the last, as Mr. Threlfall not only proved that he knew his subject thoroughly—he has been associated with the glass-tubing industry since the end of the 1914-18 war—but revealed himself as a man with a keen sense of humour, which made his lecture all the more acceptable. "The glassmaker," he asserted, "should be a cross between a pachyderm and an Admiral Crichton, with something of Faraday, something of Talleyrand, much of the make-up of Gilbert's heavy dragoon, the persuasiveness of Pericles, and the thermal endurance of that asbestine trio, Shadrach, Meshech and Abednego." In his concluding remarks, Mr. Threlfall expressed the hope that what he said had not been without interest, "even though, in my efforts to avoid the Scylla of desiccation, I may have lost some point to the Charybdis of frivolity." He need have had no fears on that score, as the large audience was quick to demonstrate.

Debts of Honour

THERE is an unpleasant type of research student—happily not especially common—whom we have all met in our pilgrimage through the ways of science. We refer to the student who conceives that the public owes him a debt of gratitude for his intellectual achievements, and regards any scholarships, grants, etc., that he may amass, simply as payments on account towards the 'liquidation' of that debt. Fortunately, a becoming modesty is a more usual attitude, while some students actually consider the grants they have re-

ceived as debts that *they* are in honour bound to repay if the opportunity arises. More especially is this so when the grants have no conditions attached to them beyond the requirement of honest work; and the Carnegie Trust for the Universities of Scotland has received an unexpected dividend, mainly as a result of its liberal policy of fostering "free and unfettered research so that the boundaries of knowledge shall be extended." Lord Normand, chairman of the Trust, speaking at the annual meeting in Edinburgh last week, announced that 94 former beneficiaries had refunded £5169 during the year, this being the highest sum of the kind that the Trust had received since its inception. Some of the payments were from newly-qualified graduates; others from men well on in years who had awakened to a sense of gratitude for the Trust's efforts on their behalf in the past. We agree with the Provost of Dunfermline who remarked, later on in the proceedings, that he could not subscribe to the view that grants to students should be regarded as debts; but we feel sympathetic with the generous impulse which leads a man, now on the road to success, to repay to the Trust the funds that put him on that road, so that it may the better be able to assist those who follow on.

A Ceramic Record

CERAMICS have always been a matter of interest to the chemical industries. We are glad, therefore, to welcome back to the scene of active publication the Doulton journal, *Ceramics in Art and Industry*, which has lately made its reappearance after an interval since 1940. Though the editor apologises for shortcomings in production due to paper restrictions, the lay-out is attractive and the illustrations excellent. As might have been expected, the current issue deals largely with events during the war, when Doultons had the dubious privilege of being the first pottery to be bombed, their Royal Doulton Works at Burslem having been hit early in October, 1940. This mischance made little difference to their production, however, and not only did the output of chemical and other ware continue unabated, but new products were also evolved as the result of continuous research. We have recorded from time to time such advances in chemical stoneware production as we were permitted to mention—even now there are certain developments still on the secret list—but such details as the great quantities of stoneware shipped to Canada for nitrating plants, the use of similar material in the manufacture of our lethal gases, and the supplies sent to Turkey for explosive plant to take place of German ware—these are now officially revealed for the first time. Developments such as these are not being allowed to go to waste; and a chapter entitled "Looking to the Future" sketches the opportunities that lie before the pottery industry in the period of reconstruction.

Simplifying Income Tax

INCOME tax is always a thorny subject, with employer and employee alike, except when some easing of the burden is announced, and we imagine manufacturers in the chemical industry would welcome, no less warmly than other business men, a measure of simplification. As things are, the manufacturer who can compute his income tax liability without having recourse to professional advice is indeed fortunate. True, a start was made by the powers-that-be in the work of codifying and simplifying income tax, but the war brought about an interruption. Now, on behalf of 4000 manufacturers, the National Union of Manufacturers is urging the Chancellor of the Exchequer to press for the pushing forward of this work, the importance of which grows with every fresh Income Tax Act or Finance Act. The Union goes a step further in expressing the hope that the Chancellor, in his forthcoming Budget, will relieve industry entirely of the burden of E.P.T. and N.D.C. These, they claim, moreover, should not be replaced by any new selective tax, such as a profits or turnover tax, for this, they contend, would obstruct revival of business activity, and would be based, in their opinion, on no equitable justification. The loss of revenue caused by the disappearance of E.P.T. and N.D.C. should, it is felt, be more than covered by economies in national expenditure.

In the campaign against silicosis, much is hoped for from experiments which are now being made for treating the coal-dust in mine roadways. Research is being undertaken to find a chemical form of treatment which will not only render the coal-dust non-explosive, but also solidify it, and experiments on one wetting agent have already shown great promise, says the *Manchester Guardian* mining correspondent.

Progress in Drugs, Fine Chemicals and Biological Products during 1945—III

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

(*Continued from* THE CHEMICAL AGE, *February* 16, 1946, *p.* 186)

THE status of tuberculostatic and tuberculocidal substances at the end of 1944 was reviewed by the writer last year (this journal, 1945, *52*, p. 57), while the tuberculostatic action of streptomycin has been referred to above. Since that date Jennings has reported an exploration of helvolic acid, a metabolite of *Aspergillus fumigatus* (*Nature*, 1945, *156*, 633), from the point of view of its activity against *Mycobacterium tuberculosis*. She points out that, as far back as 1913, Vaudremer found that *M. tuberculosis* incubated in the presence of a filtered culture fluid of *A. fumigatus* lost its acid-fast staining properties and its virulence for animals. The active principle was thermostable. Using helvolic acid, Jennings found that in slide cultures of human red blood cells from citrated blood a concentration of the acid as low as 1 in 100,000 caused the development of smaller colonies, while at 1 in 1000 dilution multiplication was suppressed completely.

Phthioic Acid

Phthioic and tuberculostearic acids are characteristic of the liquid fatty acids from the lipoids of the tubercle bacillus, and Polgar and Robinson (*J. Chem. Soc.*, 1945, 389) have pointed out that there is evidence that phthioic acid is "the specific cellular substance responsible for the tubercle, the characteristic lesion of tuberculosis." They also point out that analogous fatty acids are characteristic of other acid-fast bacteria, and draw attention to the fact that Velick and Anderson (*J. Biol. Chem.*, 1944, *152*, 523) find that extracts of the crown gall, *Phytomonas tumifaciens*, which stimulates plants to abnormal cell growth resembling malignant animal neoplasia, also contain fatty acids similar in several respects to those found in the tubercle bacillus. These fatty acids are therefore of wide as well as fundamental biological interest. The authors have collected all available evidence as to the chemical and physical characterisations of these acids, and conclude from this together with their own experimental work that phthioic acid, $C_{26}H_{52}O_2$, is most probably 3 : 13 : 19-trimethyltricosanoic acid. The synthetic acid has properties corresponding with

$$CH_3.(CH_2)_2.CH(CH_3).CH_2.CH(CH_3).(CH_2)_6.CH(CH_3).CH_2.COOH$$

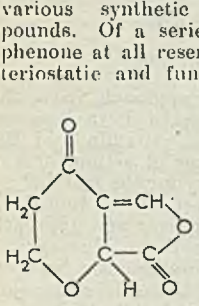
Bun-Hoii (*Nature*, 1945, *156*, 392) shows that the attempt to find tuberculostatic material based on an approach from the antagonism principle breaks down because, as far as is known, no "vitamin" of the *p*-amino-benzoic acid type of action, or any known other, is necessary for the metabolism and growth of *M. tuberculosis*. Bun-Hoii, therefore, develops an entirely new approach to the problem of antagonism. He suggests that there might be an antagonism between plastic constituents of the cell and some substance of closely related molecular structure which, if supplied to the organism, would be capable of being assimilated into the cellular framework without being able to exercise the vital function. Bun-Hoii obtained from dead bacilli of a virulent stock of human origin a mixture of fatty acids which he converted to the corresponding primary amines. He found that the mixture of amines was highly bacteriostatic towards *M. tuberculosis*, growing on synthetic media, at a dilution of 1 in 10,000. It is sugggested that the effect of the simple change of radical, while maintaining the molecular structure, bridges the gap between chemotherapy and immunology.

The complete specifications of two patents have been accepted during 1945, each of which refers to the manufacture of antibiotics. B.P. 569,844 (Levi, Terpessen, and I.C.I.) refers to the purification of penicillin involving a chromatographic type of separation. B.P. 572,818 (Birkenshaw, Michael, and Therap Res. Corp. of Gt. Britain) protects the manufacture of patulin which, as reported in our 1944 review, has not satisfied hopes in connection with treatment of the common cold.

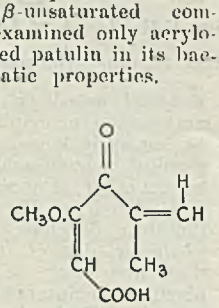
Mechanism of Bacterial Action

Geiger and Conn (*J.A.C.S.*, 1945, *67*, 112) point out that many α-β-unsaturated ketones react with sulphydryl groups. Patulin and penicillic acid are examples of this class of compound which, further, are inactivated so far as their bacteriostatic properties are concerned by sulphydryl compound. They consider that the bacteriostatic activities of these compounds are due to interference with the normal metabolic functioning of sulphydryl groups by attachment of the RSH group across the double bond. Challinor (*Pharm. J.*, 1945, *154*, 116) has pointed out that the mode of action of penicillin may be of a similar nature. The action of penicillin may be prevented by the amino acid cysteine ($CH_2SH.CH_2NH_2.COOH$) or its esters; but not by the

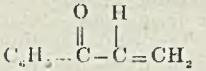
corresponding hydroxy amino acid or S-methyl crysteine. Geiger and Conn observe that the only grouping common to patulin an penicillic acid is $-CH-C-C=O$, and proceed to consider the potentialities of various synthetic α-β-unsaturated compounds. Of a series examined only acrylophenone at all resembled patulin in its bacteriostatic and fungistatic properties.



Patulin



Penicillic Acid



Acrylophenone

Cavallito and Haskell (*J.A.C.S.*, 1945, 67, 1991), investigating the mechanism of bacterial action, point out that patulin and penicillic acid are members of a wider group of antibiotic substances (including anemonine and $\triangle\alpha\beta$-hexeno-lactone) which are al lactones. The question arises as to the extent to which bacteriostatic action may be a function of this group. They find that several unsaturated lactones react with cysteine and related aminothiols by the addition of the thiol group to the double bond, followed in some cases by reaction of the lactone group with the amino group with loss of water. Thus, antibiotics in this group may react with the sulphydryl groups and possibly the amino groups of enzyme proteins.

Any attempt towards understanding the action of bacteriostatic substances must take into consideration the selective action exercised by many antibiotics between gram-positive and gram-negative organisms. The knowledge to date of the biochemical differences between these two groupings is almost non-existent. Henry and his co-workers had earlier turned their attention to the significance of gram-positiveness and its antithesis. Now they have isolated the material responsible for the stain in the cytoplasm of gram-positive organisms (*Nature*, 1945, *156*, 720). They find it to be a high molecular complex between a reduced basis protein and magnesium ribonucleate. The protein involved was found to be of a novel type and to differ from known protamines and histones. When the two organic parts of the complex are separated they do not separately take the gram stain. The gram-positive nucleo-protein of *Cl. welchii* generally resembled that of yeast, but the two components of the former were more difficult to separate. Moreover, while the nucleoprotein of yeast contained ribonucleic acid (c.25 per cent.) that from *Cl. welchii* contained desoxynucleic acid (c.3.5 per cent.) as well as ribonucleic acid (27.0 per cent.). A further difference was that the dissociated protein of yeast contained $-SH$ groupings while that from the clostridium contained $-S-S-$ groupings.

Protein-nucleates were also separated from gram-negative organisms, but only with difficulty, and these materialse took the stain only with difficulty, and in intensity of staining were not comparable with those produced with gram-positive materials. Among the gram-negatives the ratio of desoxyribonucleic acid to ribonucleic acid was much higher than among the gram-positives. The authors conclude that there is a fundamental difference between the basic protein of gram-positives and that of gram-negatives, and between their modes of combination with nucleic acid. They believe that a more complete study of these differences is necessary to an understanding of the mechanism of the selective attack of some antibiotics.

Sulphonamides

Among bacteriostatic substances other than antibiotics the pace of development has not been maintained as compared with the early days of the war. "The Medical Use of the Sulphonamides" (M.R.C. War Memorandum No. 10) has been issued in a second edition during the past year. It includes references to only three additional sulphonamides—sulphamerazine, phthalylsulphathiazole, and marfanil—and has been somewhat recast to take stock of the new situation created by the increasing availability of penicillin. The section on the toxic and harmful effects of sulphonamides has been brought in line with the most recent information with due emphasis on the risks of sensitisation.

Goldberg (*J.C.S.*, 1945, 464) describes the preparation of compounds of the type $NH_2C_6H_4.SO_2NH-CH_2SO_2NH.R$ in which the structure of sulphanilamide and taurinamide are each implicit. A feature of these compounds is the interpolation of methylene groups between the aryl nucleus and the sulphonamide residue. It will be recalled (this journal, 1945, January 13, p. 56) that, in contrast, marfanil (4-homosulphanilamide) has a methylene group interposed between the aryl nucleus and the N^4 amino group. Goldberg finds that alkyl and aryl aminoethane-sulphonamides possess only slight *in vitro* antibacterial activity while the sulphanilamidoethane-sulphonarylamides possess considerable *in vitro* and *in vivo*

activities and have toxicities of a very low order.

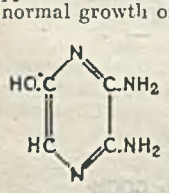
Short *et. al.* (*J.C.S.*, 1945, 240) describe the preparation of a marfanil-like series of compounds by condensing aceto-*p*-chlorosulphonylbenzylanilide (prepared by the chlorosulphonation of acetobenzanilide) with ammonia, 2-aminopyridine, etc., The antibacterial activities have been examined, but reports are not to hand.

Barry and McNalty (*Nature*, 1945, *156*, 48), have found that methyl half-esters of certain disubstituted succinic acids are bactericidal *in vitro*. They are strongly hæmolytic, are antagonised by serum globulin, but are not excessively toxic to laboratory animals. The discovery is reported from America of a new class of compound, the members of which are bacteriostatically effective towards pathogenic organisms which are resistent to sulpha-drugs. The most active member of the group is sulphanilyl-dibromoanilide which has been found effective in the treatment of pneumonia, tetanus, gas-gangrene, boils, spinal meningitis, and gonorrhœa in laboratory animals.

Dewar and King (*J.C.S.*, 1945, 114) have examined the efficacy of substituted pyrazoles in the heterocyclic nitrogenous ring of sulphonamides. The only compound found to be more effective than sulphanilamide was *p*-aminobenzenesulphonamido - 5 - amino-3-methyl-pyrazole

Williams (*Biochem. J.*, 1945, 39) has found that from 7 to 9 per cent. of the dose of sulphonamides fed to rabbits is excreted in the urine as 3-hydroxy-sulphanilamide which oxidation product was excreted as its ethereal sulphate. From 40 to 80 per cent. of the sulphanilamide was excreted in its actylated form while only a small amount was excreted conjugated as its glucuronide. 3-Hydroxysulphonamide has been detected spectroscopically in human sulphanilamide urine.

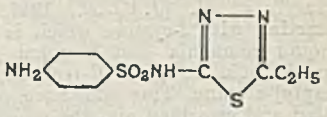
Steten and Fox (*J. Biol. Chem.*, 1945, *161*, 333) have isolated a new heterocyclic amine—probably 2-hydroxy-5 : 6-diaminopyrazine—from culture medium in which the normal growth of *E. coli* has been prevented by bacteriostatic concentrations of a range of sulphonamides. The product does not arise directly from the sulphonamides and may be either a normal intermediate in some metabolic process blocked by the drug or an abnormal product formed under the influence of the drug.



German Developments

It has been reported that during the war years sulphadiazine and "globucid" (*p*-aminobenzene-sulphonamido-ethyl-thiodiazol) were developed in Germany. Globucid has an unpleasant taste and is less effective than sulphadiazine. The higher homologues of

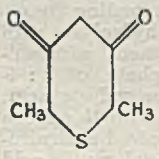
Globucid



this substance with isopropyl, butyl, etc., substituted for ethyl were more effective but had not been marketed.

Krebs and Speakman (*Biochem. J.*, 1945, 39) show that the solubility of sulphonamides in buffer solutions of different *p*H may be predicted from a knowledge of two constants: the solubility of the undissociated sulphonamide and the acid dissociation constant. For physiological purposes most sulphonamides may be regarded as monobasic acids whose undissociated form is sparingly soluble, but whose alkali salts are readily soluble. The non-absorption of sulphaguanidine and sulphasuxidine appears to be connected with the non-ionisation of the sulphonamide nitrogen. In sulphaguanidine both nitrogens are substituted, while in sulphasuxidine the acidic properties are masked for physiological purposes by the introduction of another acidic group.

During 1944 Gulland and Farrar (*Nature*, 944, *154*, 88) reported cyclotelluropentane-3 : 5-dione, and especially its dimethyl derivative, to have antibacterial activity. Bergel *et al.* (*Nature*, 1945, *156*, 481) have prepared and examined its sulphur analogue



which shows equivalent antibacterial activity with its dioxime derivative. Bergel produces arguments against the theory of Gulland and Farrar that the grouping

$$-C.(CH_3).C(OH)C-$$

is specifically concerned with antibacterial activity and that the basis of the reaction is a substrate competition with pyridoxin.

Bios, the yeast growth factor of Wildiers, was for many years wrapped in mystery. In 1922 Fulmer and Nelson showed that two entities were involved and they were named Bios I and II respectively by Miller. Since that time both Bios I and II have been shown to be complex mixtures according to the following scheme.

Bios

Bios I. Bios II.

- Mesoinositol
- Aneurin (B1)
- Nicotinic Acid
- Pyridoxin (B6).

Bios IIA = pantothenic acid

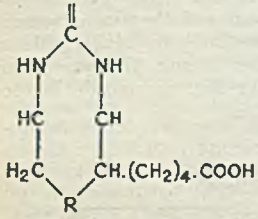
Bios IIB = biotin (H)

Biotin was the last member of the complex to yield to attempts to elucidate its structure; towards the end of 1944 its syn-

thesis was announced, but details were not available in time for inclusion in last year's review. The synthesis was accomplished by Harris *et al.* (*J.A.C.S.*, 1944, *66*, 1756), starting with *l*-cystine which is reduced in liquid ammonia and coupled with chloracetic acid to give β-(carboxymethylmercapto)-alanine. This substance was benzoylated and esterified and the reaction product treated with sodium methoxide in methanol to give the sodium salt of 4-benzamido-3-ketotetrahydro-2-thiophene carboxylic acid methyl ester, racemisation taking place during the last step. This compound is hydrolysed and decarboxylated in aqueous acetic acid/hydrochloric acid mixture to give 4 - benzamido - 3 - ketotetrahydrothiophene (I).

The valeric acid side-chain is introduced by an aldehyde prepared from glutaric acid, the monomethyl ester of which is converted, through γ-carboxy-methoxybutyryl chloride, to methyl-γ-formyl butyrate by the Rosenmund reduction method. The aldehyde ester is condensed with (I), with piperidine acetate as catalyst, to give the methyl ester of 4-benzamido-3-keto-$\Delta^{2\gamma}$-tetrahydro-2-thiophene valeric acid, which is converted to the -3-oximino-derivative by treatment with hydroxylamine in pyridine.

Reduction with zinc dust in acetic acid/acetic anhydride solution gives the methyl ester of acetoamido-4-benzamido-4 : 5-dihydro-2-thiophene valeric acid (II) and another compound. Hydrogenation of (II) over palladium followed by fractional crystallisation gives the corresponding tetrahydro compound which, on hydrolysis with barium hydroxide and treatment with sulphuric acid, gives the sulphate of 3 : 4-diamino-tetrahydro-2-thiophene valeric acid. Treatment of this compound with thiophene gives the two racemates of hexahydro-2-oxo-thiene (3 : 4)imidazole-4-valeric acid which are known as *dl*-biotin and *dl*-allobiotin. *dl*-Biotin is resolved through its esters with mandelic acid to give biotin, the laevo-form being physiologically inactive.



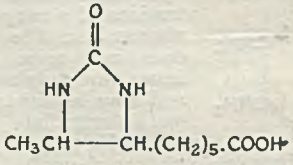
R≡S = *Biotin*
R≡O = *Oxybiotin*

So potent is biotin that its effect on yeast-growth is detectable at a dilution of 1 in 10,000 × 10^6 parts.

Hoffman (*J.A.C.S.*, 1945, *67*, 1460) has announced the synthesis of *dl*-oxybiotin, which appears to be utilised by yeast without prior transformation to biotin, according to Winnick *et al.* (*J. Biol. Chem.*, 1945, *161*, 405). Thus, the sulphur atom is not essential to the metabolic acceptance of biotin. *dl*-Oxybiotin has, however, only half the activity of *d*-biotin which, as already pointed out, is the only active isomer. If, similarly, when *dl*-oxybiotin has been resolved into its optical isomers the *d*-isomer alone proves active, then oxybiotin and biotin may prove to be equally effective. The carboxyl group is of importance to the action of oxybiotin, since its substitution by a primary alcohol group reduces its activity to one-300th for *S. cerevisiæ* and *L. arabinosus*. Replacement of the valeric acid side-chain by a methyl group reduces the activity to one-millionth of that of biotin for the test organism. Hydrolysis of the urea ring in both *d*-biotin and *dl*-oxybiotin reduces the activity to about 10 per cent. in the case of the former and to about 1.5 per cent. in the case of the latter.

A form of dermatitis in rats fed on uncooked egg-white was observed in 1927 by Boas-Fixsen, the development of which was prevented by a liver-extract fraction called "vitamin H" by Szent-Györgi. In humans fed on raw egg-white a scaly dermatitis, ashen-grey pallor, numbness of the skin, and nausea develop; this condition can also be cured by the administration of biotin or its methyl ester. This condition, known as "egg-white injury," is now known to be due to inactivation of biotin by the formation of an inactive complex with "avidin," a protein-carbohydrate complex present in egg-white which has been prepared in crystalline form. Interestingly enough, oxybiotin, its methyl ester, and the primary alcohol group mentioned above, are inhibited by avidin, which suggests that the carboxyl group is not involved in combination with the inhibitor. The diamino-carboxylic acid produced by hydrolysis of the urea ring is not inhibited by avidin. Winnick and his co-workers find that avidin combines stoichiometrically with these growth-promoters.

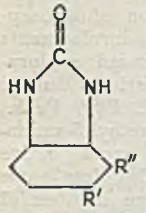
Du Vigneaud and Wood (*J.A.C.S.*, 1945, *67*, 216) have synthesised *dl*-desthiobiotin,



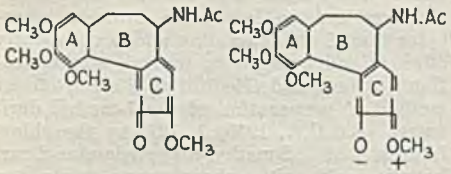
which has been found to be equally as effective as biotin in supporting yeast growth. Tatum (*J. Biol. Chem.*, 1945, *167*, 455) brings evidence that desthiobiotin in probably a normal intermediary in the biosynthesis of biotin.

English *et al.* (*J.A.C.S.*, 1945, *67*, 295)

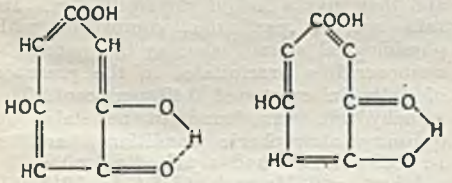
have synthesised two closely-related series, in one of which R″ in the annexed formula is $-(CH_2)_n.COOH$ when R′ is H, while in the other R″ is H when R′ is $-(CH_2)_n.COOH$. The carboxylic ring might be benzene or cyclohexane to give a urylenobenzene and a cyclohexane system respectively. The compounds examined proved to be potent biotin antagonists with few exceptions when assayed with yeast or *L. casei*. In general, the cyclohexane derivatives were more potent than the corresponding benzene derivatives.



Dewar (*Nature*, 1945, *155*, 141) proposes an unusual seven-membered ring structure in ring B of colchicine which is the potent mitotic poison responsible for the arrest of division at metaphase and for the experimental induction of polyploidy. The seven-membered ring has been shown by Dewar (*Nature*, 1945, *155*, 50) to be present also in the metabolic mould product, stipitatic acid. In each case Dewar claims that the seven-membered ring has caused difficulty in elucidating structure. Subject to confirmation of the above structure, he suggests that resonance is set up between I and II.



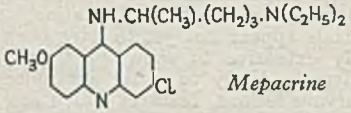
(I) *Colchicine* (II)



(I) *Stipitatic Acid* (II)

Mepacrine

Mepacrine, the manufacture of which has been developed in this country during the war, has attained the status of an antimalarial drug of major importance. Mepacrine is indicated in the same field of therapeutics as that occupied by quinine. There is little difference in toxicity and neither of these drugs prevents relapses in vivax malaria. The development of mepacrine as a drug has occurred as a consequence of the loss of quinine supplies, and it remains to be seen to what extent mepacrine holds its place in the face of increasing availability of quinine. Mepacrine has some advantages over quinine, but it is doubtful whether they would have been sufficiently great to have enabled mepacrine to make such deep inroads into the quinine market before the war. It is likely that it will continue to be necessary for mepacrine to be administered under medical supervision, but the *British Medical Journal* has editorially expressed the view that quinine " may still be the safest drug for general employment with medical supervision." One thing is certain : the availability of mepacrine as an alternative drug will stabilise the price of quinine, and will serve to promote efficiency in the quinine industry, from the plantation to the extraction plant. The manufacture of mepacrine, principally for use by the armed forces, has been on a huge scale. One firm alone in this country is reported to have produced in one year 100 tons, sufficient for 2000×10^6 tablets.



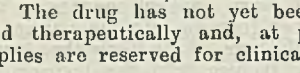
Mepacrine

From the point of view of relative toxicities the status of mepacrine may be improved by recent observations. Hammick and Chambers (*Nature*, 1945, *155*, 141) have observed that when racemic mepacrine is administered to man, the *l*-form is excreted unchanged in the usine. Subsequently Gause (*Nature*, 1945, *156*, 784) pointed out that the biological relations of the optically active isomeric mepacrines have been investigated in Russia during the past few years. It has been found that while both isomers are effective in malaria the *d*-form is half as toxic as the *l*-form for mammals and birds. Further, the *d*-form is less toxic to man than the racemic form, while the antimalarial potency is the same in either case. Gause suggests that for these reasons the *d*-form may be expected to attract increasing attention in the therapeutic field.

Paludrine

Towards the end of 1945 the development of a new synthetic antimalarial called "paludrine" was announced, and particulars of its constitution have been made available recently. It is N^1-(*p*-chlorophenyl) - N^5 - isopropyl - biguanidine. It is a simpler compound than any other known antimalarial, and it is reported to be easier to manufacture than mepacrine or pamaquin. It is said to be three

times more potent than mepacrine, and ten times more potent than quinine, but it appears to be no more effective than mepacrine or quinine in controlling benign tertian malaria. However, paludrine is said to be more efficient prophylactically as well as less toxic than mepacrine and quinine in use. The drug has not yet been fully explored therapeutically and, at present, all supplies are reserved for clinical investigation.



Paludrine

Paludrine has an advantage over mepacrine in that, unlike the latter, it does not stain the skin. It is stated to be rapidly absorbed when administered *per os* (*B.M.J.*, 1945, 653) and appropriate blood concentrations are built up by twice-daily ½ gm. doses for 14 days. About one-third of the dose so administered is excreted in the urine, and the drug is well tolerated, although large doses have showed signs of causing gastro-intestinal irritation. Clinical trials appear not yet to have been sufficiently extensive to show whether or not the drug is likely to cause agranulocytosis or nervous lesions, features which are often not developed until a drug has been introduced into widespread use.

An ingenious portable plant has been developed by the U.S. War Department for the production of totaquine (the total alkaloids of the chinchona bark) at the seat of the harvest (*Chem. Eng. News*, 1945, *23*, 1770; *J. Amer. Pharm. Ass.*, 1945, *6*, 234) which utilises a base-exchange technique. Plant weighing 1500 lb., and capable of being transported by mules, can process 13,000 lb. of bark per month, using 1000 lb. of process chemicals. This 13,000 lb. of bark produces about 170 lb. of totaquine or about 120,000 ten-grain doses at a cost of $0.0038 per dose, and 96 per cent. of the alkaloids in the bark are recovered. The fresh bark is macerated with 1/10-normal sulphuric acid and the resulting solution is passed through ion-exchange material. The adsorbed alkaloids are freed as bases by passing caustic soda through the columns, and the bases are elutriated with alcohol and recovered in a charcoal-fired portable still.

Tonkin and Werk (*Nature*, 1945, *156*, 631) have found a non-alkaloidal constituent in the bark of *Fraxinus malacophylla* and the root of *Dichron febrifuga*, samples of which were collected by the scientific mission to China headed by Dr. Joseph Needham. The substance is effective against trophozoite-induced infection by *P. gallinaceum* in chicks, but the growth of erythrocytic (exo-) forms was not prevented. No further information is available concerning the nature of this valuable substance.

Antiseptics

Coming to the consideration of antiseptics, we find that the main developments have derived from the continued exploration of the aminoacridine series. Rubbo, Albert, and Gledhill (*Br. J. Exp. Path.*, 1945, *26*, 160) report that 1-methyl-5-aminoacridine is less toxic and more active than 5-amino-acridine and also less toxic and more active than a large number of other derivatives of 5-amino-acridine which were examined. Wien *et al.* (*Lancet*, 1945, December 15), however, disagree; they find that while the 1-methyl and 2-methyl derivatives are less toxic than the parent 5 aminoacridine when administered by the parenteral route, the activities are about the same. They state that the two methyl derivatives are no less toxic towards leucocytes than 5-aminoacridine and consequently offer no advantages in topical administration. Albert and Gledhill give a convenient method of preparation of the 1-methyl derivative (*J.S.C.I.*, 1945, *1*, 127) by the chlorination of 2-methyl-diphenylamine-2-carboxylic acid with phosphorous penta- or oxy-chloride to give 1-methyl-5-chloroacridine which is converted to the corresponding aminoacridine by ammonium carbonate.

Falk and Lederer (*Pharm. J.*, 1945, *155*, 208) have reported on the pharmacy of 1-methyl-5-aminoacridine which, they find, does not appreciably stain fabrics or skin, and they give a list of compatibilities. Its salts are, in particular, compatible with physiological saline, whereas the parent 5-aminoacridine precipitates in the presence of salts in excess of 0.45 per cent. The monohydrate was found to be stable in ordinary atmospheric conditions, and a 1 : 1000 solution had a *p*H of 6.0±0.5.

Albert and Magrath (*J.S.C.I.*, 1945, *64*, 30) give a synthesis for 1 : 9-dimethyl-proflavine and claim it as more effective than any aminoacridine hitherto available against the gram-positive organisms *S. aureus*, *Str. pyogenes*, and *Cl. welchii* without any corresponding increase in toxicity towards mammals. The stain on the skin from the monohydrate is more orange than that produced by proflavine, but less intense. Unlike salts of proflavine, it has no bitter taste; it is more stable to light and more resistant to fungal growth. Proflavine hemisulphate, which is neutral in reaction, is now offered on the British market in place of the official salt which is so acid as to be likely to cause necrosis of tissues.

(To be concluded)

Glass Tubing

Lecture by Mr. R. E. Threlfall to the B.A.C.

THERE was an attendance of well over 150 at a meeting of the London Section of the British Association of Chemists at Gas Industry House, London, S.W., on February 13, when Mr. R. E. Threlfall gave a most interesting lecture entitled: "Glass Tubing."

Mr. E. Leighton Holmes, chairman of the section, presided, and the hon. secretary, Mr. Norman Sheldon, referred to the valuable work which Mr. Threlfall had done for the glass tubing industry since he took up the fight against German competition after the war of 1914-18. There was no doubt, he said, that Mr. Threlfall's work had ensured the winning of the war more easily than would have been possible had his factory not existed. Mr. Sheldon went on to warn the Government that unless they revised their ideas of recruitment for the Forces and declared that skilled workers in the master key industries—including the glass tubing industry—were more important at their work than they would be in the Forces, then a major catastrophe could be anticipated.

Mr. Threlfall, in his opening remarks, referred to the manufacture of glass tubing in the Stourbridge district, which, he said, began in 1914-1918, when Belgian refugees passed on their skill in tube drawing to the youth of Worcestershire. He enumerated briefly a small but astonishingly varied selection of uses to which glass tubing is put, reminding his audience that whether they were chemists or laymen, instrument makers or dairymen, politicians or hospital patients, they could not live to-day without the help of glass tubing.

Variety of Compositions

This variety of uses calls for a variety of compositions, for just as in metal an aluminium saucepan differs from an armour-piercing bullet, so the tubing used for a glass electrode is very different from that used in micro-analysis. The word "glass" often brings up a mental picture of a bottle or a window, but the range of glass compositions which exists to-day is enormous, and many are vastly different from either bottle or window glass, which are mainly sand with lime and soda. Modern glass may contain almost any known element and may have no silica or alternatively no alkali.

The new optical glasses contain neither silica nor alkali, but consist of boron, barium, and rare earths, and have to be melted in platinum. One new glass, in which hydrofluoric acid could be stored, was essentially a metaphosphate. The glasses used for combustions in micro-analysis have no alkali, nor has glass fibre from which tape is made for the electrical industry. It is possible to choose the most suitable composition for almost any known purpose, but each must to some extent be a compromise. As hand-drawn tubing is usually made from glass melted in comparatively small units, it is possible, if the need arises, to obtain supplies of tubing in a very wide range of composition, much wider than for bottles and other articles requiring large-scale manufacture.

Special Requirements

Laboratory soft soda tubing must not contain compounds which reduce when worked in a gas flame. Glass for hypodermic syringes must have a coefficient of expansion which lies between certain limits, so that fusible metal may grip it, but not too hard. Glass for dolls' eyes must hang on to soft iron wire with little or no annealing.

If chemists are not satisfied with the chemical or physical properties of the glasses they use they should not hesitate to make inquiries from and offer suggestions to the glassmakers. The average laboratory usually holds stocks of soft soda and hard borosilicate glass tubing and rod, with some combustion tube and possible some lead glass. If it is a physical laboratory some special tungsten and molybdenum sealing glass may be necessary, but in the chemical laboratory an occasional platinum seal is usually all that is wanted. The laboratory furnisher can supply all these needs, but the chemist must keep a careful watch on the activities of the buying department in the bigger firms or institutions who are inclined to buy on price and not on quality, with results that may be very disturbing in the laboratory.

Reference was made to lead glass which has fallen into disuse in most laboratories and among glass-blowers because of the blackening which occurs owing to the reducing action of the glass flame. If worked in the tip of the flame, or still better with a little oxygen, it will not blacken and has many useful properties. It melts easily, has a long range of plasticity, requires little annealing, and is so elastic that it will hang on to other glasses of fairly wide difference of expansion. For this reason it can often be used for joining two kinds of glass together and for repairing apparatus.

The lecturer then described the manufacture of glass tubing. The bulk of glass tubing and rod made to-day is machine-drawn and is largely consumed by the medical services and in lamp making. The laboratory uses only a small part of the

output, but its needs are varied and highly specialised and call for smaller quantities, which must often be hand-drawn. Machine-drawn tubing can be distinguished from hand-drawn by examining the striae. If they are parallel to the length of the tube it is hand-drawn, for the machine-drawing gives a twist which is never taken out.

Machine-Drawing Process

The method of machine-drawing used in the Danner process was described. The glass flows from the furnace over a revolving mandrel, around which it wraps itself until it spills over the end and is drawn off on rollers for perhaps 100 ft. Air is pumped down the mandrel and through an aperture at the end. The flow of glass, the speed of the pull, the revolutions, the diameter of the mandrel, and the temperature of working are adjusted to produce the desired size and wall-thickness.

In hand-drawing, the process is very different and needs the greatest possible skill. The glassmaker gathers a ball of molten glass from the furnace or the glasshouse pot. He rolls this on a steel plate to shape it and puffs air into it to form the bore of the tube. When this operation is completed the gathering is reheated and another man joins an iron rod to the other end of the ball and holds it while the first man walks backwards, drawing the tube out and blowing all the time to keep the wall from collapsing. A third man fans the tube, gauges it with a pair of callipers, and directs the speed of the drawer. The tube is then laid on a wooden ladder to cool before being cut up.

The skilled tube-drawer has to work to one or two millimetres in diameter and entirely by eye. He must have a combination of qualities which are rare in one man, and for that reason he cannot be trained in the course of any given war, a matter which Government departments do not easily realise. His physical qualities must include, in the words of the lecturer, delicate footwork, lungs capable of blowing the guts out of a trombone, and ability to work in continuous heat. The work is healthy and glassmakers do not suffer from lung trouble. Most of them live to a good old age. Thermometer-tube drawing is probably the most difficult of all glassmaking operations. In the lens front clinical thermometer, the bore, which is only 0.04 mm., must be in the correct position in relation to the lens, otherwise it is useless.

A Suggestion

Chemists and engineers were urged to visit glassworks and study the production methods in order that their metal-made ideas about tolerances might be corrected. This applies particularly to designers who usually expect glass to be made to impossibly fine limits.

The lecturer then went on to give a large number of useful practical hints for storing, testing, cleaning and manipulating glass tubing. He advocated the storage of glass tubing horizontally, as vertical storage means that pieces of glass fall down the tubes and scratch the bores—and the inside skin of a tube is far more delicate than the outside. Cotton wool should be placed loosely in the ends when the tubes breathe with changing temperatures. Racks should be slatted so that broken pieces fall through the slats and the bottom space should be left high enough to sweep under. A tube should never the pulled out until it had first been relieved of the weight of tubes on top of it; similarly, a glass tube should never be pushed in tightly among others. Tubes should be stored, if possible, against a lighted background, so that differences of colour help to identify misplaced stocks.

The lecture was illustrated with drawings made for the purpose by Mr. C. Digby Lovell.

A discussion which followed was opened by Sir Robert Robertson, F.R.S., who congratulated Mr. Threlfall and said he hoped arrangements could be made for the lecture to be published in full as a brochure. At the close Dr. F. W. Stoyle expressed thanks to the lecturer and stressed the importance of co-operation between manufacturers and consumers of glass tubing and other scientific equipment. The audience inspected a number of interesting exhibits.

INDIANS' FAREWELL LUNCHEON

At the farewell luncheon given at Grosvenor House on Monday to the Indian Chemical Manufacturers' Association delegates on the eve of their return to India, Dr. K. A. Hamied, their leader, expressed the delegation's thanks to the leading men in the British chemical industry for their courtesy, sympathy, and goodwill. He said they had found that American makers of plant and machinery were no better in the way of deliveries than were British firms. Though for peak production Britain could obviously never be equal to the United States, yet with the natural resources and man-power of India, combined with the technical and scientific knowledge of Britain, it should be possible to compete both in quality and quantity with any country in the world.

Cordial goodwill and readiness to co-operate were expressed in speeches made by Mr. L. P. O'Brien, president of the A.B.C.M., Mr. Keith Fraser, chairman of the B.C.P.M.A., and Sir Frederick Bain, formerly the chairman of the Chemical Control Board.

Antimalarial Research

New American Compounds

AS a result of antimalarial research during the past four years, under the auspices of the U.S.A. Board for the Co-ordination of Malarial Studies, compounds considered superior to quinacrine (atabrine) have been developed.

Among these are several members of the 4-aminoquinoline series, including SN7618, 7-chloro-4-(4-diethylamino-1-methylbutylamino) quinoline. An effective suppressive when administered no more frequently than once weekly in a well-tolerated dose, it causes an abrupt termination of the clinical attack of *vivax* malaria and cures *falciparum* malaria when administered for only one or two days. It does not discolour the skin as does quinacrine, nor does it give the disagreeable gastrointestinal symptoms which are sometimes observed with the administration of quinacrine. Several other compounds in this same chemical series also appear to be superior to quinacrine.

Parliamentary and Scientific Committee

Election of Officers

AT the annual general meeting of the Parliamentary and Scientific Committee, held in London on February 12, Sir John Anderson was elected president by unanimous resolution, and Lord Bledisloe, Lord Brabazon, Dr. W. R. Wooldridge, and Professor E. N. da C. Andrade were re-elected vice-presidents. Mr. J. G. Bennett proposed that past presidents be officers of the committee, and, this proposal being carried unanimously, it was agreed that past presidents should have the rights of vice-presidents. Lord Dudley and Lord Samuel have served as presidents of the committee.

A ballot to elect officers for 1946 produced the following result: vice-chairman elected, Professor A. V. Hill; Dr. J. Vargas Eyre and Mr. J. G. Bennett tied for the post of hon. treasurer; and Sir Wavell Wakefield, M.P., and Mr. M. P. Price, M.P., tied for the position of chairman. In consequence, the election of officers to fill these last two posts was postponed until the executive committee's meeting on February 26 or later, as well as the consequential elections of a deputy-chairman, a joint hon. secretary, and two vice-presidents. As a result of the election of Professor Hill to the vice-chairmanship, there is a further vacancy for a vice-president from among the representatives of scientific organisations, and nominations are invited. Major Freeman, M.P., Dr. Clitherow, M.P., and Lord Halsbury were elected members, but the election of the Institute of Welding and the Research Committee of the Aluminium Development Association was deferred to the next meeting.

Other proposals carried unanimously at the meeting were that a special Steering Committee should be set up to plan the activities of the executive committee, and that there should be two joint honorary secretaries instead of one. Major R. F. Maitland continues in one of these joint posts; election for the other will take place later, as already indicated. Commander C. Powell was re-elected secretary to the committee for the coming year.

Plasticiser Prices

Increase Announced

FOLLOWING the withdrawal on January 1 of the rebate of 5d. per proof-gallon formerly paid to users of industrial alcohol, British makers of phthalate plasticisers and of trieresyl phosphate announce amended prices, operative from February 1, the principal changes affecting the diethyl and dibutyl esters. The following are the present prices per lb. (carriage paid in U.K. in returnable containers).

Dimethyl phthalate, from 1s. 0½d. for 10-ton lots to 1s. 3½d. for 5-gal. cans; diethyl phthalate, 1s. 1¾d., to 1s. 4½d.; dibutyl phthalate, 1s. 2½d. to 1s. 6½d.; diamyl phthalate, 1s. 4d. to 1s. 6¾d.; tricresyl phosphate, 1s. 6¾d. to 1s. 9½d.

Since the removal of licensing from phthalate esters, announced last November (*see* THE CHEMICAL AGE, 1945, December 1, p. 506), consequent upon the cessation of Government demands, supplies of most of these esters are abundant. The little-used diamyl phthalate is in relatively short supply, since most of the home-produced amyl alcohol is required for penicillin manufacture *via* amyl acetate. Tricresyl phosphate continues to be also in short supply for the time being.

ROSIN PRICES

It is announced that on and after March 1 the selling prices per cwt. of gum and wood rosin sold through the agents, the United Kingdom Naval Stores Association, Ltd., 46 St. Mary Axe, London, E.C.2, will be as follows:.

Gum Rosin: Medium Pale, Greek D.E., and Spanish B.D.E., 44s.; F/I K. & M., 47s.; N. & W.G., 48s. 6d.; W.W., 52s. 6d.; X.W.W. & Y., 53s.; A.A., 3A. and 4A, 53s. 6d.; Crystal, 54s.

Wood Rosin: B., 38s.; F.F., 43s.; K., 45s.; Vinsol and Truline Binder, 32s.

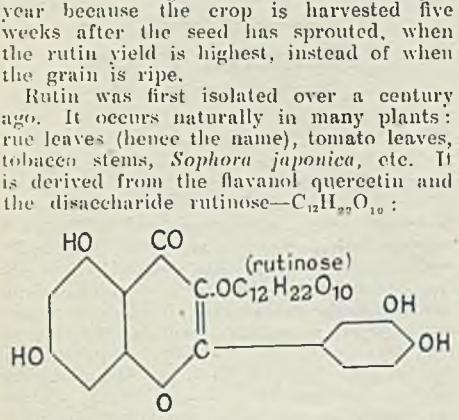
For many months the prices have been standing at 42s. to 45s. per cwt. for gum rosin, and 30s. 6d. to 40s. for wood rosin, according to grade.

Rutin from Buckwheat

Large-Scale Production in U.S.

THE U.S. Department of Agriculture has announced that full-scale production of rutin, a drug of value in the treating of capillary frangibility arising from high blood-pressure, will begin shortly. Large-scale production of the drug is now possible through the discovery that the green buckwheat plant is an economic source. The drug is found chiefly in the leaves and blossoms of the plant. Buckwheat producers will be able to grow more than one crop a year because the crop is harvested five weeks after the seed has sprouted, when the rutin yield is highest, instead of when the grain is ripe.

Rutin was first isolated over a century ago. It occurs naturally in many plants: rue leaves (hence the name), tomato leaves, tobacco stems, *Sophora japonica*, etc. It is derived from the flavanol quercetin and the disaccharide rutinose—$C_{12}H_{22}O_{10}$:



Its medicinal value, however, was not revealed until research began two years ago by the Department's Bureau of Agriculture and Industrial Chemistry and clinical tests in the University of Pennsylvania proved its worth.

Besides the application of the drug in the treatment of weakened blood vessels, research has led to the opinion that it may also be an aid in nutrition by contributing to the growth and hardness of teeth and bones much in the manner of vitamin C. Dr. P. A. Wells, director of the Eastern laboratory of the Bureau of Agriculture and Industrial Chemistry, estimates that 10,600 lb. of rutin would be required for medical purposes in 1946. Eventually, he said, 1,300,000 lb. would be needed annually to meet both medical and nutritional requirements.

Fluorine Compounds

Recent Work in the U.S. and Germany

NEWLY developed fluorine products described in *Chemical Industries* (1945, 57, 1084) include a rat poison and an incendiary medium.

The former, sodium fluoroacetate, has been investigated by the Fish and Wild Life Service of the U.S. Ministry of the Interior, who discovered its efficacy as a rat poison, sorely needed to replace strychnine and red squill during the war. The chemical is exceedingly toxic to man. The material is still in the development stage, but Mr. I. N. Gabrielson, director of the Service, predicts that the material will be available for civilian use under regulations that will guarantee its rational and safe use.

Ethyl trifluoroacetate is being manufactured by Columbia Organic Chemicals Co., South Carolina, according to *Chem. Eng. News* (1945, December 25, p. 2365). It is prepared by the oxidation of trifluorotrichloropropylene, covered by a Du Pont patent. The ester is a clear colourless liquid with a pleasant odour and a density slightly greater than water. It is extremely volatile and has a boiling point of 61°C. The company is also producing ethyl difluoroacetate, trifluoroacetic acid, and sodium trifluoroacetate.

Chlorine Trifluoride

Conversations of an American Technical team with members of the I.G. Farben staff have elicited the information that chlorine trifluoride, first described in 1930, was produced on a pilot-plant scale in Germany during the war. Several tons of the material were made in a small pilot plant built by the Wehrmacht at Kummersdorf, about 30 miles south of Berlin (*see* Report No. 166, U.S. Department of Commerce).

The material, a stable liquid boiling at 12°C., was found unsatisfactory as a fluorinating agent, but Wehrmacht officers expressed interest in its incendiary properties. It is believed that the German Army intended to use ClF_3 in shells against aircraft and tanks. The properties of the substance would be peculiarly suitable in an attack, since organic matter would be immediately ignited, and glass or plastic windows would be permanently etched and rendered opaque. Glass wool is said to burn with a flame in the presence of ClF_3, and the reaction with water is so vigorous as to give off incandescent gases.

The compound is made by heating proper proportions of the gaseous elements to 280°C. in a U-tube. The vapours are condensed at −80°C. and run into iron cylinders which are vented several times to allow fluorine, chlorine, and chlorine monofluoride to escape. The fluorine is produced by electrolysis of potassium acid fluoride in a magnesium cell with carbon anodes. The metallic magnesium vessel serves as the cathode. The cell is operated at 100°C., being charged continuously with anhydrous H.F. The evolved H_2 and F_2 are cooled in a coil immersed in dry ice, to remove HF, and are mixed with chlorine. A blue flame is said to result at the point of mixture.

Spain's Chemical Industry

Need for Imported Supplies

IN spite of the considerable expansion that has taken place during the last few years in the Spanish chemical and pharmaceutical industries, the country, lacking many raw and basic materials, is still dependent on imported supplies. The magnitude of this demand is apparent from the fact that, in 1943, chemical and pharmaceutical goods occupied, with 678 million pesetas, or 20 per cent., the second place among import licences.

Imports of chemicals rose in value from 58 million gold pesetas in 1941 to over 90 million in 1942 and reached a record figure of 132 million in 1943, equal to about 15 per cent. of total imports. In 1944, imports declined again to 90.8 million gold pesetas, not so much because of a decline in demand or an increase in local output, but essentially owing to the increasing difficulties in obtaining supplies, thanks to the war-time dislocation of transport throughout Europe. This assumption appears to be substantiated by the fact that 63 million, or over two-thirds of the 1944 imports, fell within the first six months. The following table presents an interesting picture of Spain's chief sources of supply (in million gold pesetas):

	1944	1943
Germany	21.7	48.6
United States	15.1	12.0
Switzerland	13.4	17.7
Great Britain	12.3	16.0
Argentina	8.7	7.5
Chile	8.6	5.0
France	1.8	3.7

In both the years under review, Germany was the chief supplier, followed, in 1943, by Switzerland and this country, while in the following year, the United States held the second place before Switzerland, Great Britain following.

Drug Imports Preponderate

As regards groups of products imported in 1944, pharmaceutical products, worth 53.9 million gold pesetas, occupied the first place, followed by coal-based products valued at 16.8 million. Imports of dyestuffs, colours, and lacquers were limited to 1.3 million. In the supply of insecticides and veterinary products, Switzerland held the leading position with 920,000 gold pesetas (nearly half the total shipments), and was the only source of calcium cyanamide, valued at 1.64 million. As regards solvents, such as acetone, methyl alcohol, etc., Swiss manufacturers despatched products worth 820,000 pesetas, out of a total of 1.48 million.

The future potential capacity of the Spanish market to absorb chemical products must be considered as favourable, notwithstanding the strong tendency to establish a national chemical industry. It is well known that the Franco régime has given great encouragement and support to these endeavours, and many new plants and laboratories have come into being during the war just ended. It appears that the largest number of new companies—51 units with an aggregate capital of 65.6 million—were formed in 1943. The total capital of companies in the chemical and pharmaceutical industry amounts, at present, to nearly 2.2 million gold pesetas. It cannot be denied that requirements for many products are now being met from domestic sources, and the number of pharmaceutical products made in Spain is stated to be 18,000. However, the country will, for some time, rely on the import of special products, raw materials, and intermediates.

Lignite in South France

Treatment for Removal of Sulphur

UP to the present, although the lignites in the Paris basin have been exploited, nothing has been done with the similar deposits in the Var and Alpes-Maritimes, despite their high calorific value, because their high sulphur content made them useless, without further treatment, for either domestic or industrial purposes. A note in the January issue of *L'Industrie Chimique* (p. 15), however, deplores the lack of enterprise displayed in thus tamely abandoning a source of great potential wealth—the deposit is easily accessible and has a surface length of some 60 miles—and suggests a method whereby it might be put to economic use.

The total sulphur content, averaging 5-6 per cent., is present in the form of iron pyrites, which occurs in the lignite either in small nodules or, more usually, finely dispersed throughout the mass. Screening, therefore, is of little value, but washing the material on gravity tables should give good results, in view of the difference in density between pyrites and lignite. In accordance with the proximate analysis of the lignite, it should be possible without difficulty to obtain, by this method of separation, two distinct products: (1) a normal coal containing 10 per cent. ash (as against 15 per cent. for the initial material); and (2) a pyritiferous earth with a 30-35 per cent. sulphur content, which could easily be raised to 45 per cent. by further concentration. Such separation by washing would not cause a prohibitive increase in the price of the lignite, since nowadays there is no lignite-mining concern which does not subject its product to preliminary washing.

The "Rumianca", Industria Elettrica, Chimica e Mineraria, Turin, has decided to increase its share capital from 150,000,000 lire to 200,000,000 lire.

A CHEMIST'S BOOKSHELF

GENERAL AND INORGANIC CHEMISTRY FOR UNIVERSITY STUDENTS. By J. R. Partington. London: Macmillan. Pp. 916. 36s.

Professor Partington has undertaken the difficult task of writing a book that shall be useful and intelligible both to pupils in the higher forms at school and to honours students at the universities, taking in ordinary degree students in his stride. In schools where chemistry is taught seriously this plan may work, but unless the higher forms are taking chemistry to a really high school standard, one feels that a book of this character may frighten rather than encourage. There is much to be said for the early introduction of a student to a comprehensive textbook in which he can learn to find his way about, because *except in the examination room* remembered knowledge is far less important than the recognition that knowledge exists, with the ability to lay one's hand upon it when needed.

This is not a book for the dilettante; it is a book for serious students. For the juniors it should be read in conjunction with a course of lectures or under the guidance of a good teacher. The teacher will explain and expand; the student will have the gist of the matter concentrated but clearly expressed. The honours student will not find all he needs in it, and must supplement it by further reading of specialist books, but the principles are here, and nothing more than an expansion of those principles is needed.

The book is divided into two main sections. Part 1, comprising 280 pp., is devoted to general and physical chemistry and in 10 chapters discusses atomic and molecular weights, the kinetic theory, the phase rule and solutions, thermochemistry, electrochemistry, mass action, electrolyte equilibria, the periodic law, modern atomic theory, the solid state, and the quantum theory of the atom. The only blemish on these chapters we have noticed is that the chapter on modern atomic theory was clearly written before the publication of Professor Smyth's account of the work which led to the atomic bomb. That is quite understandable, and we have no doubt that the author will wish to make some revisions in the next edition. The bulk of the book is occupied with the inorganic chemistry of most of the known elements. This follows the usual plan of a brief account of the manufacture of the element or compound with a more extended account of its chemistry. The industrial descriptions are of uneven quality; for example, we notice an excellent illustration of a very modern type of coke oven (though largely meaningless because there is no description of how it works, nor would the normal lecturer in chemistry be able to supply one) with, in the same section, a fearful and wonderful "diagram of a coal gasworks." This, however, is a small matter.

To sum up, Professor Partington is to be congratulated on the production of a book that should be of immense value to students and lecturers alike. We wish that we had had just such a book in our student days. We predict that it will be largely used in colleges and universities.

PLASTICS, SCIENTIFIC AND TECHNOLOGICAL (2nd Ed.). By H. Ronald Fleck. London: English Universities Press. Pp. 361. 30s.

The title of this book is well chosen, as it indicates its scope as a concise textbook on the chemistry and technology of plastics. That a second edition was called for so soon after the first is sufficient testimony both to the efficiency with which its aim has been attained and to the growing interest that industry is taking in plastics. Much new material has been included in the text of the new edition.

After a short exposition of the history of plastics, the theoretical principles of polymerisation are set out in detail, and the chemistry of raw materials and plastic materials is described. The following chapters are devoted to the manufacture of plastic materials and of synthetic elastomers. The physical properties of thermoplastic and thermosetting materials are dealt with and adequate data are provided on synthetic resins, synthetic fibres and textiles, adhesives, plywood and impregnated wood. The potential user is provided with a description of the manufacture of dies and moulds as well as of plastic articles, and the book concludes with a survey of the chemical analysis of raw materials and the chemical, physical and electrical testing of plastics.

A notable feature is the wealth of 90 figures, while five appendices give general characteristics of the various plastics. References to available technical literature are contained in the text and will be just as useful as the comprehensive name and subject index, which shows that even more plastics are handled than those included in the "Plastics' Properties Chart," recently published by the Industrial Magazine Service, 122 East 42nd Street, New York, 17, and supposed to be fully up-to-date.

The book is a valuable contribution to the contemporary literature of plastics and should be in the hands of all those engaged in this field.

Production of DDT in the U.S. is now at the rate of 2,750,000 lb. a month, but available supplies are considered insufficient to meet demand.

Parliamentary Topics

Imports from the U.S.A.

LAST week in the House of Commons, the Chancellor of the Exchequer, in reply to questions from several Members, gave figures of the value of imports from the United States both for the year 1945 and for the last quarter of that year. The following items were included (value in £'000; figures in brackets refer to the last quarter): Crude petroleum, 1539 (293); refined petroleum, 115,798 (10,085); paraffin wax, 1154 (269); other manufactured oils, fats, and resins, 2555 (712); synthetic rubber, 6143 (1342); celluloid, 1632 (493); iron and steel, 2460 (1); electrolytic copper, 1345 (88); other non-ferrous metals, 906 (95); carbon blacks from natural gas, 1606 (563); all other chemicals, drugs, dyes and colours, 5627 (695).

Preference on U.K. Oils

Colonel Erroll asked the Chancellor of the Exchequer what the present effective preference was on light oils manufactured in the United Kingdom from indigenous materials; and on heavy oils so manufactured and used as road fuel in the United Kingdom; and for how long, and at what rate, the guaranteed preference would continue to operate.

Mr. Dalton: Ninepence a gallon in both cases. A preference of 8d. a gallon is guaranteed until 1950, subject to the conditions set out in the Finance Act, 1938.

Tin Industry

Mr. Janner asked the Secretary for the Colonies whether, in view of the liberation of Malaya and the imminent rehabilitation of the Malayan tin industry, he would give his approval to the 1943 scheme of the International Tin Research Institute, under which it was proposed that the tin miners should spend approximately £300,000 a year on tin research and which was reduced, at the request of his Department, to a temporary basis of £100,000 a year.

Mr. George Hall said that, in view of the uncertainty as to the long-term position of the tin industry, the International Tin Research and Development Council, which controls the Tin Institute, had agreed, subject to confirmation by the Governments concerned, to work on the basis of an annual budget of £100,000 up to 1950.

Ground-Nut Crop

Answering Mr. Turton, the Secretary for the Colonies stated that the latest report from Nigeria indicated that the current season's ground-nut crop would be highly satisfactory, representing an increase of nearly 100,000 tons over the 1943-44 crop. In the Gambia this year's target was set at last year's figure of 40,000 tons.

Personal Notes

MR. W. JENKINS GIBSON has been appointed a director of Hadfields, Ltd.

SIR FREDERICK BAIN, a deputy-chairman of I.C.I., was, at the meeting of the F.B.I. Grand Council on February 13, appointed deputy-president of the Federation.

LT.-COL. F. J. BYWATER has become a director of the South Metropolitan Gas Co., filling the vacancy caused by the death of Dr. E. F. Armstrong.

The honorary degree of D.Sc. is to be conferred on PROFESSOR E. K. RIDEAL and SIR ALEXANDER FLEMING by the University of Dublin.

DR. C. L. PARSONS has retired from the position of secretary and business manager of the American Chemical Society after 39 years' service. He has been a member of the society since 1893.

MR. H. W. CREMER has accepted an invitation of the committee of the Privy Council for Scientific and Industrial Research to be chairman of the Water Pollution Research Board.

PROFESSOR W. E. S. TURNER, who retired from the Chair of Glass Technology at Sheffield University on December 31 last, is to receive from the Council of the University the title of Emeritus Professor.

MR. and MRS. ERNEST LAW, of Castleton, Lancs., celebrated their golden wedding on February 5. Mr. Law entered the manufacturing chemist's business of his father at Castleton in 1896, and ultimately took control of the concern, which was sold later, and is now carried on at Smallbridge under the title of James Law (Chemicals), Ltd.

MR. GEORGE SCHICHT has resigned from the boards of Lever Bros. & Unilever, Ltd., and Lever Bros. & Unilever, N.V., after 42 years with those companies and their predecessors in business. He was at one time prominently associated with the Schicht soap and cattle concern at Aussig in Czechoslovakia.

MAJOR JULIAN DAY has been appointed chairman of the Council of the Association of Gas Corporations; COL. R. H. STUDHOLME becomes vice-chairman; and MR. H. A. PROBIN succeeds Mr. J. R. W. Alexander as hon. secretary, the latter having resigned on his appointment as general manager of the British Gas Council.

MR. T. HARRY HEWLETT, chairman of the Anchor Chemical Co., Ltd., of Manchester, who completed 50 years' service with the company on January 27, has received suitably inscribed mementoes of the occasion—a silver salver from his fellow-directors and a leather writing compendium from the staff.

DR. E. VOCE, M.Sc., Ph.D., who has been appointed metallurgist to the Copper Development Association, joined the staff of the British Non-Ferrous Metals Research Association in 1930. All his major investigations have been concerned with copper and its alloys. During the war, he carried out a long series of investigations on copper for shell bands on behalf of the Ministry of Supply.

MR. F. A. LESSER has been appointed joint managing director of Borax Consolidated, Ltd., at the comparatively young age of 44, after being on the board since May, 1943, and having first joined the company in 1922. Educated in England and the U.S.A., he has had long and varied experience both here and overseas, which, added to his fluent knowledge of foreign languages and extensive travel, has proved of the greatest value to the company. MR. A. J. SOMERS has been appointed to a seat on the board of the same company.

Obituary

SIR HARRY SPEAKMAN, who died at Leigh, Lancs, on February 16, aged 80, was a member of the executive committee of the Federation of British Industries, and a director of Manchester Collieries, Ltd. He was a past president of the Lancashire and Cheshire Coal Association and of the Manchester Geological and Mining Society, and had served on the executive committee of the Mining Association of Great Britain.

German Technical Reports

Further Material Available

THE latest list follows of reports of the British Intelligence Objectives Sub-Committee (BIOS) and the Combined Intelligence Objectives Sub-Committee (CIOS).

CIOS XIX—3. *Chemical plant, Ludwigshaven* (1s.).

CIOS XIX—4. *Hydrogen peroxide production through 2-ethyl anthraquinone* (1s.).

CIOS XXIII—18. *Bad Lauterberg (Harz)*: Production of concentrated hydrogen peroxide solutions (3s.).

CIOS XXIII—21. *I.G. Farben, Leuna*: Nitrogen fixation plant (1s.).

CIOS XXIII—25. *I.G. Farben, Elberfeld and Leverkusen*: Miscellaneous chemicals (4s. 6d.).

CIOS XXIV—19. *Anorgana G.m.b.H. Werke, Gendorf*: Miscellaneous chemicals (3s. 6d.).

CIOS XXV—44. *Electro - Chemische Werke, Höllriegelskreuth*: Hydrogen peroxide (1s. 6d.).

CIOS XXVI—52. *I.G. Farben, Bitterfeld*: Manufacture and fabrication of polyvinyl chloride (1s.).

CIOS XXVI—53. *I.G. Farben, Leunawerke, Merseburg*: Manufacture of caprolactam (6d.).

CIOS XXVI—76. *I.G. Farben, Oppau*: Manufacture of polyisobutylene (6d.).

CIOS XXVII—16. *I.G. Farben, Wolfen*: Fabrication of plastics (1s.).

CIOS XXVII—18. *Oxo Plant, Ruhrchemie Oberhausen-Holden*: Olefines production process (6d.).

CIOS XXVII—73. *Deutsche Sprengstoffe, Aschau and Ebenhausen*: Manufacture of nitrocellulose (1s.).

CIOS XXVII—80. *I.G. Farben, Uerdingen*: Miscellaneous chemicals (2s. 6d.).

CIOS XXVII—92. *German carbide, cyanamide, and cyanide industry* (5s.).

CIOS XXVIII—18. *Gesellschaft zur Verwertung Fauthscher G.m.b.H., Wiesbaden*: Oilseed processing and oil refining (1s.).

CIOS XXVIII—23. *A.G. Sachsische Werke, Espenhain*: Fuels and lubricants from brown coal (2s.).

CIOS XXVIII—36. *H. Koppers G.m.b.H. Essen*: Low temperature carbonisation of coal, synthesis gas producion (1s.).

CIOS XXVIII—62. *Glossary of some names for chemical products* (2s. 6d.).

CIOS XXIX—3. *I.G. Farben, Bitterfeld and Aken*: Production and fabrication of magnesium alloys (1s. 6d.).

CIOS XXIX—5. *Dessauer Werke für Zucker und Chemische Industrie A.G.*: Production of wood sugar from soft woods, fermentation, and separation of yeast (6d.).

CIOS XXIX—14. *I.G. Farben, Leverkusen*: Miscellaneous chemicals (6s. 6d.).

CIOS XXIX—19. *Vereinigte Aluminium-Werke A.G., Grevenbroich*: Aluminium reduction and scrap recovery (1s.).

CIOS XXX—5. *Synthetic lubricating oils* (6d.).

CIOS XXX—6. *Preparation of "Alkazid" M and DIK* (6d.).

CIOS XXX—10. *I.G. Farben, Hoechst* (1s.).

CIOS XXX—18. *Oil recovery from Württemberg shale* (3s. 6d.).

CIOS XXX—102. *Scholven Hydrogenation Plant* (4s.).

CIOS XXX—104. *Botrop - Welheim Hydrogenation Plant* (3s.).

CIOS XXX—105. *Gelsenberg Hydrogenation Plant* (4s. 6d.).

BIOS 86. *Oils and Fats Industry* (5s.).

BIOS 107. *Production of a phosphate fertiliser by sintering phosphate rock with sodium sulphate and lignite* (1s. 6d.).

BIOS 118. *Munich Technical High School*: Fuels and lubricants (6s. 6d.).

BIOS 131. *Treibstoff Werke Rheinpreussen Moers, nr. Duisberg*: Production of alcohols and ketones from olefines (2s.).

BIOS 143. *German Porous Ceramic Industry* (2s.).

BIOS 158. *Degussa Plants*: Production of beryllia and beryllium (2s.).

General News

From Week to Week

The G.P.O. announces that the normal telegraph service with the United States has now been restored.

The headquarters of the Association of Scientific Workers have been moved from 73 High Holborn, W.C.1, to 15 Half Moon Street, W.1. (Tel: GROsvenor 2424).

Our attention has been called to the fact that the numbers of the British Standards for high-purity zinc are B.S.1003 and 1004, and not as stated in our issue of January 26 (p. 116).

A new Trading with the Enemy (Amendment) Order—No. 14—contains about 60 additions to the previous lists, and about 100 deletions. It includes the Instituto Bioquímico Miguel Servet, S.L., Vigo, Spain (S.R. & O. 1946, No. 183).

The Control of Talc and Pyrophyllite (No. 2) (Revocation) Order, 1946 (S. R. & O., 1946, No. 210), has been made revoking the Control of Talc and Pyrophyllite (No. 1) Order, 1943, which regulated the acquisition and disposal of those materials. It came into force on February 18.

The board of Lever Brothers and Unilever N.V. is to convene an extraordinary general meeting at which authority will be sought to enter into a new equalisation agreement with Lever Brothers and Unilever, Ltd. It is hoped also, at an ordinary meeting for 1946, to recommend dividends on the ordinary shares in respect of the war years.

A new handbook, especially valuable to the recent entrant into chemical industry, is *The B.A.C. To-day,* just issued by the British Association of Chemists, 175 Piccadilly, London, W.1. It presents a concise, objective, and comprehensive picture of the activities and achievements of the Association.

The Science Museum, South Kensington, was partially opened last week. Among the new exhibits on view is a group illustrating the release of atomic energy, including specimens of uranium minerals and an ingot of uranium metal; another relating to the application of X-rays in commerce and war; and the quartz-crystal clock which can measure time to within 1/1000 sec. per day.

At a conference held in London, the President of the Board of Trade met representatives of the Industrial Salvage and Recovery Movement, representing about 10,000 leading industrial firms who co-operate through local groups in stimulating the recovery of industrial waste materials and their best utilisation in the national economy. At the conference a National Council was formed, of which Mr. H. G. Judd, C.B.E., was appointed president.

Foreign News

The Polish Association of Applied Chemistry is reported to have repaired the Pelikan ink and dyestuff plant in Danzig, as well as a glue factory in Olawa, Silesia.

The Celanese Corporation of America has acquired new plant at Belvidere, New Jersey, to produce chemicals, plastics and related products.

A phosphate rock deposit near Bartow, Florida, is being purchased by International Minerals and Chemical Corportion, who plan large-scale operations.

Canada expects to get as its share of German reparations some Nazi plants which were used in the manufacture of rocket fuel. Two of these plants produced hydrogen peroxide and hydrazine hydrate.

The glass plant at St. Inglevert, Belgium, has resumed production. Daily output totals 15,000 square metres, and already about 200,000 square metres have up to date been delivered to France.

The foreign copper purchase programme conducted by the U.S. Office of Metals Reserve until October, 1945, is being re-established. The office plans to purchase copper during the first half of 1946 at the rate of 20,000 tons per month.

Solutions of hyoscine hydrobromide in water, or in water containing a small proportion of free acid, have been found by Danish experimenters to stand autoclaving at 120° C. for 20 minutes without any demonstrable change.

Imports of coal and coke into Sweden in 1945 amounted to 439,000 tons. In December the figure was 88,212 tons, made up as follows: From Poland, 24,778 tons of coal, 3,190 tons of coke; from the U.S., 19,632 tons of coal and 24,482 tons of coke; from Holland, 16,130 tons of coke only.

Great interest has been aroused by the official Chilean announcement that oil has been discovered near Punta Arenas at a depth of 7,500 ft. Press reports have been optimistic, but some time must elapse before it can be established that the oil is suitable in quality and quantity for commercial development.

Tetranitrocarbazol has been used as an insecticide in Germany for several years, according to a member of an American mission who went to that country to study wartime chemical development. It is distilled from coal-tar by a process which produces equal amounts of tetranitrocarbazol and anthracene.

A German engineer, Alphonse Kuhnel, interned at the Melnik camp, has placed at the disposal of the Czech Government a new process for the production of synthetic rubber, of which he is the inventor.

In the Alma-Ata region of the Soviet Union, a plant for the manufacture of phosphate fertiliser is nearing completion. It will supply, in the main, cotton and rubber growers in Central Asia.

U.S.A. Civilian Production Administration is warning chemical, paint and tetra-ethyl lead manufacturers to conserve supplies. A similar warning to battery manufacturers, to conserve lead supplies, is made in view of an estimated deficit of 180,000 tons for 1946.

The production of titanium in the Cameroons is to be increased by improvements made to the hitherto rudimentary plants in operation. Output for 1946 is estimated at 3500 tons of ilmenite and 10,000 tons of mixed ores.

The Ethyl-Dow Company closed its bromine-from-seawater plant at Kure Beach, North Carolina, at the end of 1945. Extraction of bromine has been practised there since 1933, and it is reported that the closure is only temporary.

In Belgium the Verreries des Hamendes have just re-lit a furnace in their Merxem division for the production of green bottles; a delivery of fifty tons of bottles has just been made to Luxembourg. About 30,000 sq. m. of Belgian window-glass have arrived in Holland.

The following amendments to the list of chemicals made in Canada have been notified by the Senior Trade Commissioner, Ottawa: additions, tetramethyl thiuram monosulphide, zinc resinate (zinced rosin); deletions, tetramethyl thiuram disulphide; zinc dimethyl dithiocarbamate.

The U.S. authorities in the American zone of occupation in Germany have decided to blow up the Lippoldsberg chemical plants near Kassel, which cost about £1,500,000 to erect. Machinery and equipment are stated to have already been dismantled in pursuance of the reparation policy.

A new catalogue (1946) of their technical and scientific books has been issued by the Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, N.Y., U.S.A. It includes the announcement, for May this year, of a new Chemical and Technical Dictionary by H. Bennett, editor of *The Chemical Formulary*.

The Italian Ministry of Commerce and Industry, which, for some time, has been endeavouring to secure sufficient raw materials for Italy's fertiliser industry, has successfully negotiated with a number of French companies for 80,000 tons of phosphates from Tunisia against delivery of 100,000 tons of pyrites.

Butyl crotonate, a colourless liquid with a pleasant odour, is now manufactured on a pilot-plant scale by Shawinigan Chemicals, Ltd., in Canada. It is soluble in alcohol and ether, and slightly soluble in water. The uses of crotonic esters have not been fully explored, but they would probably be most suitably employed as plasticisers.

According to official Swiss statistics, the Federation exported, in 1945, chemical and pharmaceutical products worth 198.2 million francs, comprising pharmaceutical and allied products to the value of 98.2 million francs, industrial chemicals worth 15.6 million francs, and dyes amounting to 94.4 million francs. There has been no decline in exports since the end of the war.

According to the Bulletin of the Netherlands Central Statistical Bureau, the production index for benzol products (1938 = 100) rose from 44 last August to 69 in October, that of coal-tar from 27 to 40, while the index for ammonium sulphate rose from 5 to 6. The index for rolled iron and steel products (1940 = 100) showed a sharp rise from nil in September to 16 in October and 50 in November, 1945.

Exports of phosphates from Morocco in 1945 amounted to 1,647,951 tons, compared with 1,463,000 tons in 1944. Meetings of the Phosphates de Constantine have approved accounts for 1942, 1943 and 1944; a dividend of 26.875 fr., wholly absorbed by the bearer share tax, was declared for 1944. Production by the company, however, is rapidly increasing and amounted to 400,000 tons in 1945, against 241,000 tons in 1944, 141,600 in 1943, and about 500,000 tons a year before the war.

A plant for the manufacture of cyanide, mainly to cover the requirements of the South African gold-mining industry, is to be erected within a few months by African Explosives and Chemical Industries, Ltd., in close co-operation with I.C.I., Ltd., at the Klipspruit sewage disposal works, on the outskirts of Johannesburg. Methane gas will be used in the manufacture of cyanide and the ammonia required in the process will be supplied from the company's synthetic ammonia plant at Modderfontein.

A plant for the treatment of phosphate rock by sodium sulphate is to be erected shortly in Tunisia by the local mechanical construction industry. The plant, equipped with electric furnaces, will be able to produce 15,000 tons a day in 1947. Plans are also being prepared for the extension of local saltworks, the extension of the Djebel-Djebelloul cement works to a capacity of 120,000 tons a year, the erection of a second cement works with a similar capacity, the establishment of new lime works, an extension of the plaster industry and the improvement and development of brickworks.

A new steel plant is under construction near Concepción, Chile, with a capacity of 180,000 tons yearly, and Bessemer, Siemens, and electrically-smelted steel will be produced. As a by-product, gas will be piped to Santiago. Iron-ore is to be supplied by the mines at El Tofo (near Coquimbo), and coal produced in the neighbourhood of Concepción is to be used for making coke. The total cost is estimated at over 1500 million pesos.

The processing of bauxite at Surinam, Dutch Guiana, is planned by a U.S. company, says *Chem. Met. Eng.* (Dec., 1945), and the calcined ore is to be sold to abrasive manufacturers. In this connection it is interesting to note that Surinam bauxite, used as a dehydrogenation catalyst in styrene production, gave an over-all yield of 40 per cent. styrene at a constant temperature of 1200° F. for 50 hrs. continuous operation, a 3-5 per cent. advantage over three other natural bauxites tested (*see Ind. Eng. Chem.*, December, 1945, p. 1149).

Forthcoming Events

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.

February 26. Society of Instrument Technology. Lecture Theatre, London School of Tropical Medicine, Gower Street, W.C.1, 7 p.m. Mr. J. E. O'Breen: "The Effect of Design of Boiler Auxiliaries on the Choice and Performance of Automatic Control."

February 27. Institute of Fuel (Midland Section). James Watt Memorial Institute, Birmingham, 2.30 p.m. Sir Alfred Egerton: "Production and Utilisation of Methane."

February 27. Textile Institute. Technical College, Ashby Road, Loughborough, 6.45 p.m. Dr. F. C. Wood: "Synthetic Finishes for Textiles."

February 27. The Chemical Society. Engineers' Club, Albert Square, Manchester, 7 p.m. Dr. C. J. T. Cronshaw: "What Industry expects from the Chemist."

February 27. Institute of Welding. Institution of Civil Engineers, St. George Street, Westminster, S.W.1, 6 p.m. Mr. R. F. Tylecote: "The Pressure Welding of Light Alloys."

February 27. Institute of Welding (Wolverhampton Branch). Victoria Hotel, Wolverhampton, 7 p.m. R. G. Braithwaite: "The Costing of Welding."

February 28. Royal Institution of Great Britain. 21 Albemarle Street, London, W.C.1, 5.15 p.m. Sir Henry Dale: "Chemical Transmitters of the Effects of Nervous Impulses."

February 28. British Association of Chemists (Notts and Derby Section). School of Art, Green Lane, Derby, 7 p.m. Professor J. B. Speakman: "Some Methods of Making Wool Unshrinkable."

March 1. Institute of Welding (South London Branch). Borough Polytechnic, Borough Road, S.E.1. Major L. F. Denaro: "Welding of Armour."

March 4. Society of Chemical Industry (London Section). Chemical Society's Rooms, Burlington House, Piccadilly, W.1. Dr. G. Newton Friend: "The Rare Earths."

March 5. Association of British Chemical Manufacturers. Lecture Theatre, Geological Society, Burlington House, Piccadilly, W.1, 2.30 p.m. Fuel brains trust. (Messrs. E. F. Hall, T. F. Hurley, O. Lyle, J. B. M. Mason and J. S. Merry, with H. M. Peacock as question master.

March 5. Hull Chemical and Engineering Society. Regal Cinema, Ferensway, Hull, 7.30 p.m. Mr. D. Bellamy: "Aspects of the Commercial Utilisation of Electricity."

March 5. The Chemical Society. Leeds University, 6.30 p.m. Dr. Kathleen Lonsdale: "Crystal Analysis as a Clue to Chemical Problems."

March 5. Chadwick Public Lecture. Sheffield University, 4.30. p.m. Dr. S. A. Henry: "Medical Service in Industry."

March 5. Electrodepositors' Technical Society. James Watt Memorial Institute, Great Charles Street, Birmingham, 6.30 p.m. Open discussion: "Electroplating and the Automobile Industry."

Commercial Intelligence

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

Mortgages and Charges

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

MOLDOPLAST, LTD., London, W., manufacturers of plastic materials. (M., 23/2/46.) January 26, £369 5s. debenture, to Robert Wyler, Ltd.; general charge.

DIXON PLASTICS, LTD., Earls Barton. (M., 23/2/46.) January 25, mortgage, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on factory and premises, The Square, Earls Barton, with machinery, fixtures, etc. *Nil. January 4, 1946.

BRONDEX CHEMICALS, LTD., Newport (Mon.) (M., 23/2/46.) January 28, £1900 debenture, to J. A. Sparkes, Seven Kings; general charge.

CLEVELAND PRODUCT CO., LTD., Middlesbrough, glue, etc., manufacturers. (M., 23/2/46.) January 21, mortgage, to Martins Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land and property at Middlesbrough, and known at one time as Yorkshire Tube Works, together with plant, machinery, etc. *Nil. July 3, 1944.

Satisfactions

GLASSO PAINT PRODUCTS, LTD. (formerly BRITISH GLASURIT, LTD.), Perivale (Middlesex), varnish and enamel manufacturers. (M.S., 23/2/46.) Satisfaction January 29, of mortgage registered May 12, 1938.

LONDON ALUMINIUM CO., LTD. (formerly L. X. C., LTD.), London, W. (M.S. 23/2/46.) Satisfaction February 1, £40,000, registered August 11, 1939.

BRITISH CELANESE, LTD., London, W. (M.S., 23/2/46.) Satisfaction January 29, of debenture stock registered October 2, 1943, to the extent of £37,659.

Notice of Dividend

BRENNAN, John Patrick, 20, Westholm Gardens, Ruislip, chemist, lately carrying on business at B. B. Technical Laboratories, Bideford Road, Perivale, Middlesex. First dividend, 5s. per £, payable February 19, at the office of Mr. Percy Phillips, 76 New Cavendish Street, London, W.1.

Company News

Fisons, Ltd., Harvest House, Ipswich, have increased their nominal capital beyond the registered capital of £2,000,000.

The Anchor Chemical Co., Ltd., is paying a final dividend of 20 per cent., less tax, making 30 per cent. (27½ per cent.) for twelve months ended Nov. 30 last. Net trading profit was £53,831.

British Industrial Plastics, Ltd., report a net profit for the year amounting to £23,516 (£21,705) and have declared a dividend of 8 per cent. (same). Forward, £12,594 (£10,164).

New Companies Registered

Varndell Plastics, Ltd. (404,656).—Private company. Capital, £1,500 in £1 shares. Manufacturers of and dealers in plastics, chemical and other substances, etc. Directors: N. Noskeau; J. Noskeau. Registered office: 16 Hampstead Road, N.W.1.

Milton Therapeutics Export, Ltd. (404,631).—Private company. Capital, £50,000 in £1 shares. Manufacturing, wholesale and retail consulting and analytical druggists and chemists, etc. Subscribers: A. Y. Johnston; D. McCarthy. Registered office: 10 and 11 Brewery Road, N.7.

Fermolin Products, Ltd. (404,361).—Private company. Capital £500 in £1 shares. Exporters, importers and manufacturers of and dealers in glues, chemical, industrial and other preparations, etc. Subscribers: C. Ridge (first director), Eleanor Hess. Secretary: H. Fraustaedter, 2 Clements Inn, London, W.C.2.

British Geon, Ltd. (404,347).—Private company. Capital, £500,000 in 275,000 ordinary and 225,000 5 per cent. cumulative preference shares of £1 each. To adopt an agreement between the Distillers Co., Ltd., B. F. Goodrich Chemical Co., of Cleveland, Ohio, and to carry on the business of manufacturers of and dealers in resins for varnishes, lacquers, etc., and moulding powders and plastic materials, and articles made from plastic materials, manufacturers and refiners of and dealers in acids, salts, alkalis, chemical, industrial and other preparations, etc. First directors: C. G. G. Hayman; L. A. Elgood; H. Woolveridge; C. J. P. Ball (nominated by Distillers Co.); Sir Walrond Sinclair; J. L. Collyer; W. S. Richardson (nominated by B. F. Goodrich Chemical Co.).

Chemical and Allied Stocks and Shares

MOST sections of stock markets remained firm. With dividend announcements continuing to include a good proportion of increases, industrial shares showed individual features and sentiment remained under the influence of hopes that the next Budget may reduce taxation.

Chemical and kindred shares tended to move higher, with Imperial Chemical 40s. 9d., Turner & Newall 84s. 3d., British Aluminium 39s., and General Electric 93s. 6d. Dunlop Rubber further strengthened to 54s. 6d. on the company's New Zealand developments. Partly on the latest news of the plastics interests of the two groups, the units of the Distillers Co. rose to 121s., and De La Rue to £10 3/16. Lancashire Dynamo were 5⅛ ex rights to the new shares, which were 21s. premium. Hopes of future bonus possibilities and attention drawn to the diversified interests of the two companies advanced United Molasses to 51s. 3d., and Thornycroft to 76s. 3d. Lever & Unilever were also good with a sharp advance to 51s. on the statement at the meeting called to agree to the proposals for continuing the dividend guarantee agreement with Lever N.V.

Iron and steels were well maintained

with Stewarts & Lloyds 57s. 6d., Tube Investments £6, and Colvilles 25s. 7½d. United Steel eased to 25s., but, awaiting the financial results, Dorman Long kept steady at 27s. 3d., with the preferred ordinary shares 51s. 3d. Aided by a number of higher dividends, the colliery section was firm with Bolsover 46s. xd, Powell Duffryn 21s. 3d., Staveley 44s. 9d., and Shipley 27s. 9d. Allied Ironfounders were 56s. 3d. ex rights to the new shares, the latter being at 8s. 6d. premium. A big rise to 60s. in Süper Oil Seals 5s. shares followed maintenance of 40 per cent. dividend and the share-splitting and forthcoming new issue proposals.

There was again a quiet trend in textiles, Bradford Dyers 26s. 1½d., Calico Printers 20s. 1½d., and Bleachers 13s. 6d. showing little movement on balance. Courtaulds at 55s. 7½d. were better on the possibility of higher earnings, British Celanese again changed hands around 35s., while there was a sharp rise to 25s. in British Enka. Awaiting results, British Plaster Board at 34s., and Borax Consolidated deferred at 49s., showed steadiness. Nairn & Greenwich moved higher at 85s., and Barry & Staines were firm at 54s. 9d., but Wall Paper Manufacturers deferred receded to 41s. 6d. Paint shares held firm, and Blundell Spence rose to 34s. 9d. on the higher distribution. British Oxygen eased to 83s. 3d., but Imperial Smelting shares rallied to 17s. 3d. Business around 25s. was recorded in Burt Boulton; Cellon 5s. ordinary were 28s.; British Drug Houses 48s. 6d.; and Evans Medical Supplies 6s. 8d. shares were again quoted at 15s. At 14s. 4½d., British Glues 4s. ordinary held their recent good rise. as did Blythe Colour Works at 20s.

Boots Drug showed firmness at 57s., and Timothy Whites strengthened to 47s. 6d. Sangers were 31s. 3d., Griffiths Houses 53s. 1½d., and Beechams deferred rose to 22s. Canning Town Glass 5s. ordinary continued around 12s. 3d. on higher dividend hopes, and United Glass Bottle were firm at 75s. Triplex Glass at 41s. 6d. held their recent rise. Oil shares eased, but Mexican Eagle remained active, and sharp gains were recorded by Trinidad Leaseholds and Trinidad Petroleum Development.

British Chemical Prices

Market Reports

A VERY firm tone continues to be maintained in the London industrial chemicals market and reports from nearly all sections indicate a steady demand. There has been a good flow of inquiry for new business, but actual bookings have been restricted in some directions by the supply position. Chlorate of soda, hyposulphite of soda, nitrate of soda, and caustic soda are active items and the demand for most of the potash compounds continues on steady lines. Among miscellaneous chemicals lead oxides are firm at unchanged rates. Arsenic is a good market and a brisk inquiry is reported for British-made formaldehyde. The coal-tar products market remains steady, supplies in many cases falling short of the demand from home and overseas markets. Pitch is in good request and the naphthalene position remains tight.

MANCHESTER.—Fresh inquiry for a fairly wide range of heavy chemical products on export account has again been reported on the Manchester market during the past week and fresh bookings have been made. There has been little change in the position of home trade business. Chemicals for the textile and allied trades are being taken up steadily against contracts and a good movement of supplies is going forward week by week to the other leading users, with replacement business coming through as the need arises. The fertiliser trade is developing satisfactorily and an outlet for almost everything that becomes available seems assured.

GLASGOW.—Considerable activity was experienced in the Scottish heavy chemical market during the past week, including a lively demand for acids, alkalis, and minerals. Supplies are still very short in most classes of chemicals and it is not possible to meet the demand. Export inquiries are numerous, covering all grades of light and heavy chemicals. Prices remain steady, with no tendency to fall.

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