The Chemical Age

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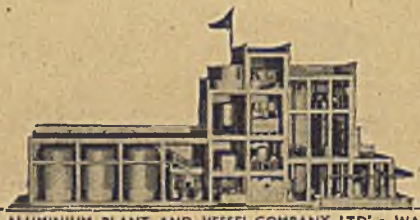

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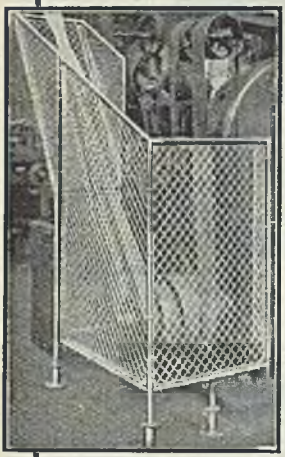

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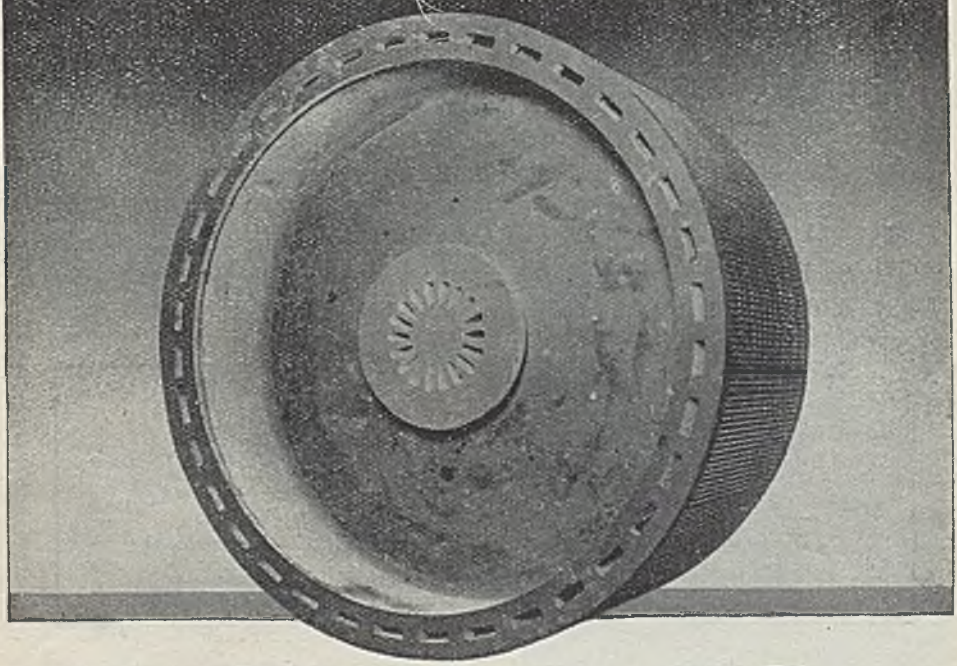

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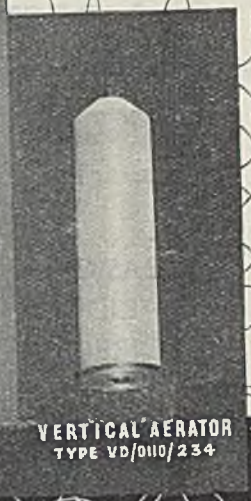

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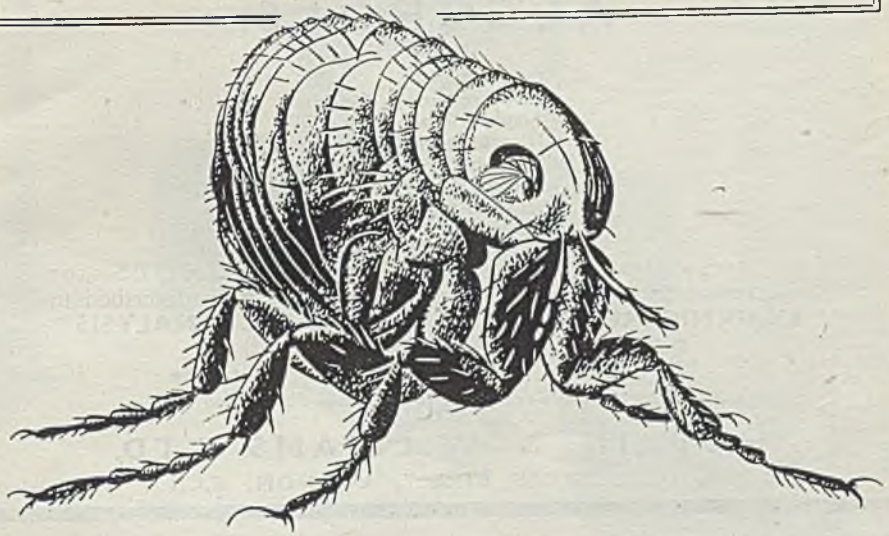

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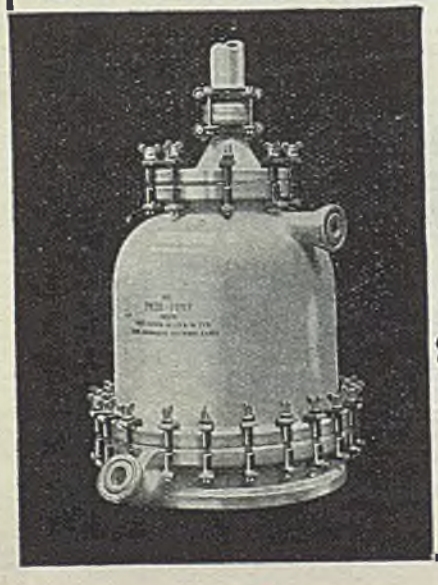

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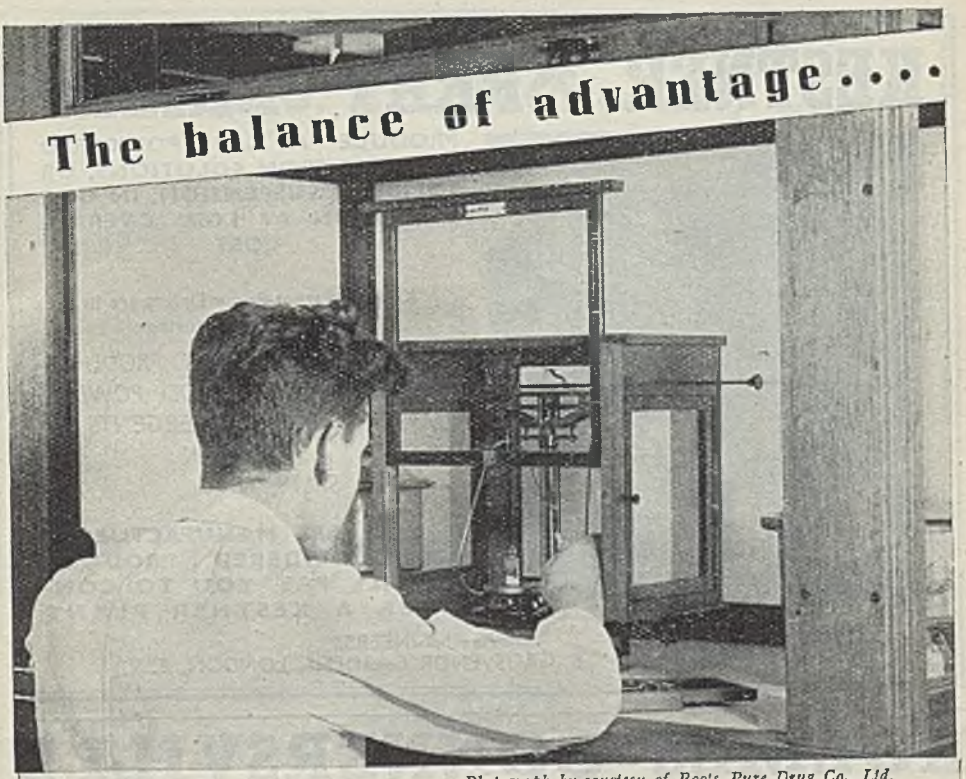

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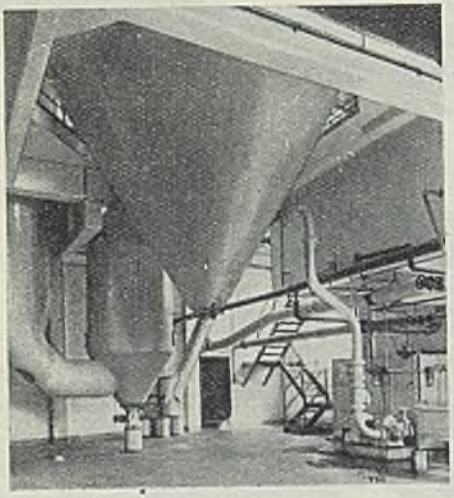

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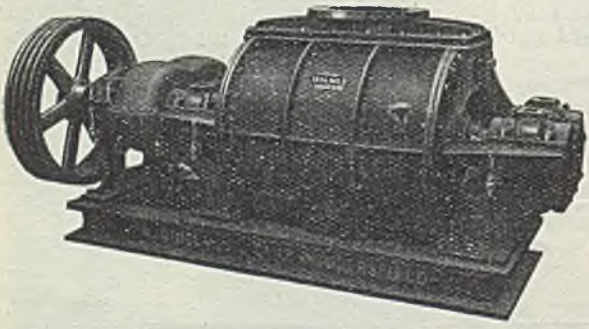

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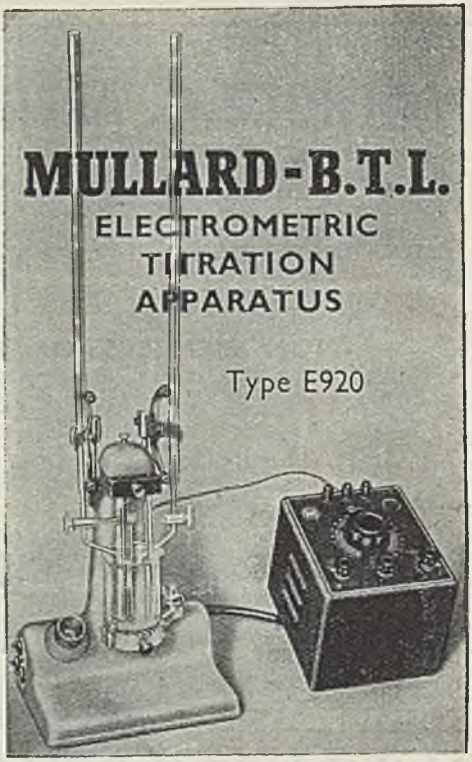

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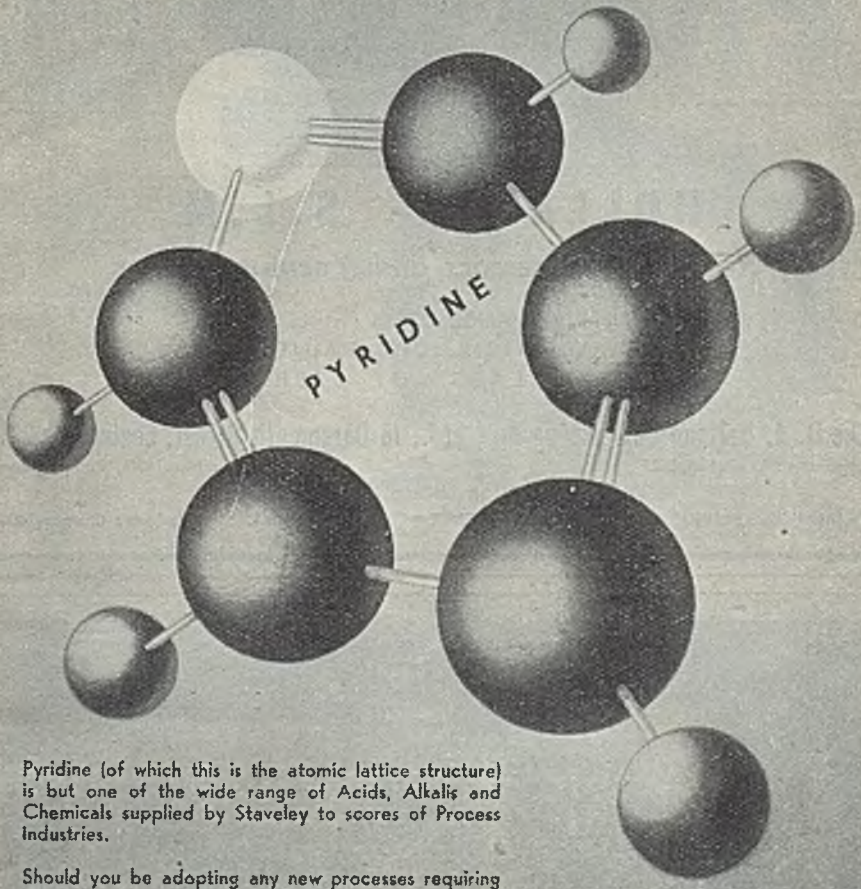

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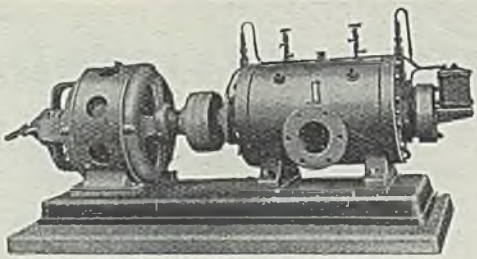

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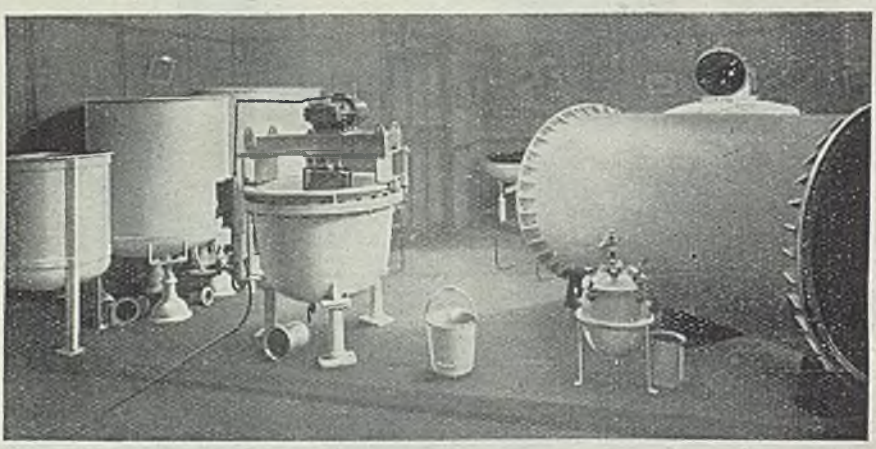

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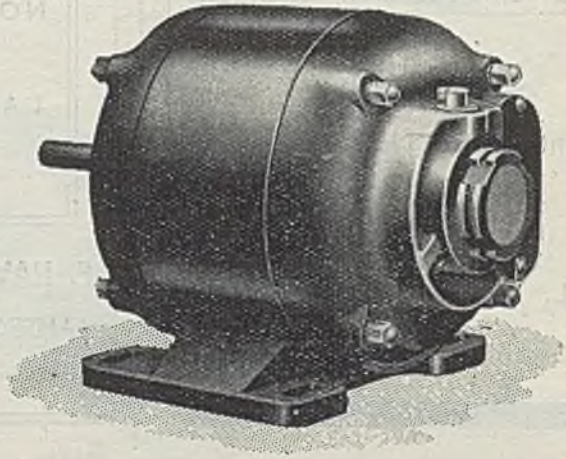

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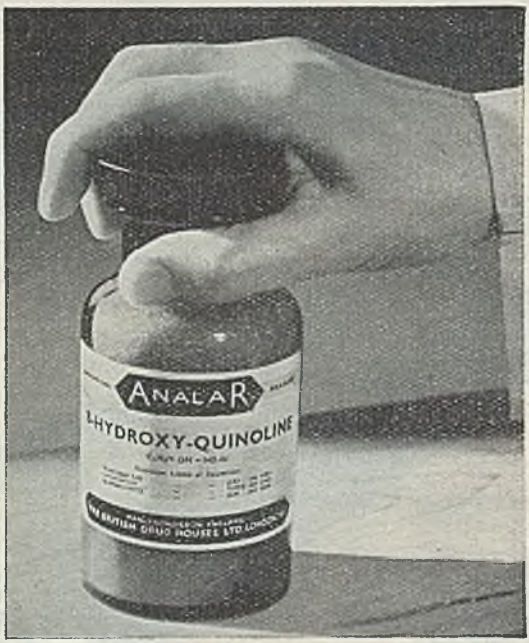

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Chemical Exports

DESPITE the hampering effect of controls, and the difficulties caused by shortage of labour and equipment, the British chemical industry has shown that it is full of vigour and enterprise. A glance at the recently published White Paper, entitled *Accounts relating to the Trade of the United Kingdom*, for the years 1938, 1944, and 1945 (H.M.S.O., 2s. 6d.) reveals the figures concerned in all their splendid simplicity: the salient feature is that the value of exports of "chemicals, drugs, dyes and colours" for the year 1945 shows an increase in value of £15,135,162 over the 1938 figure—£37,414,951 against £22,279,789. Not only that: the actual volume of exports is up by 3 per cent. in 1938, the value *at 1935 prices* being £21,495,000 against £20,780,000. Among the various categories of manufactured articles sent out of the country, the chemical exports show by far the greatest increase over the 1938 figures; they have this year outstripped their nearest rival, silk and artificial silk, which held the leading place in 1944. Indeed, it is the additional increase since 1944 that is the most significant factor; to bring the total figure up from £5¾ million to over £15 million in one year is a magnificent effort.

Before going into the details, which deserve close study, it may well be worth while to give a little consideration to the reasons why the chemical industry in this country has shown such remarkable progress; and at the same time to explore various suggestions that have been made for maintaining that progress while keeping a lookout for pitfalls gaping before the feet of the complacent or the unwary. It must not be forgotten that, great though the contribution of the chemical industry may be to the re-establishment of this country on a sound economic basis, we are still very far from being out of the wood; and if we are ever to get out of it, more and more production is yet demanded. The industrial chemists have taken the lead, and their fellow-citizens, still in jeopardy, look to them to keep straight forward on the road to prosperity.

Two main factors have helped to encourage the expansion of the chemical industry during and since the war. In the first place a wide diversity of products is involved, so that, taking the industry as a whole, it is always possible to gain on the swings what is lost on the roundabouts. Secondly, the industry appears to have been able to keep on good terms with its war-time controllers, who, for their part, exercised their func-

On Other Pages

tion with a wisdom and moderation not always reproduced in other branches of industry; moreover, the controls have been, or are being, successively relaxed with a reasonable modicum of speed. We believe that these two advantageous factors result from the prevailing tendency throughout the industry in the direction of a loose but practical organisation rather than towards rigid control. The majority of constituent firms have retained their individuality without losing the capacity for co-operation.

The remarkable expansion which has manifested itself since the war has been due, in part at any rate, to the wide-awake information service maintained by the Association of British Chemical Manufacturers. As opportunities offered themselves in foreign markets—many of them, notably on the European side, former German preserves—the A.B.C.M. has been able to keep its members advised of what was going on, and the industry has shown characteristic enterprise in stepping into the breach. Visits of British industrialists to Scandinavia and the Low Countries (for example) have been encouraged, and their "opposite numbers" have been welcomed here. This is a valuable form of "market research"—to give it its high-flown modern appellation—which functions steadily without the aid of any state-subsidised multi-initialled organisation.

No "howl" was raised by the chemical industry during the war to express its dissatisfaction with things in general. Too often such a noisy expression of opinion is little more than camouflage, directing the public eye away from the maladministration within an industry, and towards the controllers—the cruel representatives of a hated bureaucracy. In war time, then, quiet efficiency was found to work better than complaints of hard usage; but unfortunately quiet efficiency is not "news," and the chemical industry got less credit, in the minds of the public, than it deserved. Now is the time for a few stories of the industry to be broadcast, and we would commend to the leaders of the industry the suggestion that something in the nature of a press campaign might be organised; and not only in the British press. It may appear a digression from our subject, but we feel that something should be done to counteract the tendency, already perceptible in the lay press, to repeat the stupid and outworn parrot-cry: "German chemicals are best." Some see in this the sinister beginnings of propaganda; it is more likely sheer ignorance.

Meanwhile, to maintain production, still more to increase it, continues to be a matter of some difficulty. Lack of equipment and obsolescence of plant are difficulties that can be overcome in time. Lack of man-power, however, is another matter, though that problem, too, can be solved if approached in the right way. There is a tendency for recruitment into certain sections of the chemical industry to become more and more reluctant; the reason for this is simply and solely that working conditions are unattractive. An educated young man—and the type of recruit wanted in the chemical industry is becoming increasingly well educated—is not going to spend his days in a mucky job when he is well aware that modern science and modern engineering can devise ways of making the job less mucky. It will cost money to do this, but that, he will say, is what employers are for. In this instance we hold that he is right; for the capital spent on improved machinery will bring a handsome return in the long run—and will even earn a remission in taxes right away. So now is the time to call in the chemical engineer to design new plant; the problem of safety in chemical plant has been fully thrashed out, and to-day it is apposite to consider amenity. As Dr. Cronshaw told us earlier in the year, chemical plant can be as beautiful as any other of the wondrous works of engineering.

Descending to details, we find that with one exception all the main groups of chemical exports showed an advance in value for 1945 as compared with 1938, and most of them in volume, too. Particularly outstanding are the figures for ammonium compounds, copper sulphate, disinfectants and insecticides, sodium compounds (especially caustic soda), drugs, and coal-tar dyes. For the actual figures we would refer the reader to the official publication; they speak sufficiently eloquently for themselves. The one group of figures which is at first sight disappointing concerns the coal-tar products "not otherwise specified," *i.e.*, not including dyestuffs and drugs. Though benzol shows a big rise (smaller since 1944) and cresylic acid a continuous upward curve, there is a notable drop in the heavy products.

The reason for this is not far to seek: we need them at home. Pitch, for example, is in demand for fire briquettes, creosote for hydrogenation, and both for creosote-pitch fuel mixture. Moreover, it must not be forgotten that the roads of this country have been neglected for six years and enormous quantities of binders are needed. The pre-war consumption was 1,000,000 tons; this year we shall use 500,000-600,000—all we can expect to get.

One final point, but a most important one: that is, the *indirect* aid given by chemicals to the export trade. A hidden volume of chemicals is contained in almost every item recorded in the accounts—glass, textiles, leather, paper, and so on. The exact amount could not be reckoned save by the most laborious analysis, but every industrial chemist can feel assured that it is very large, and a valuable contribution to the total of these vital figures.

NOTES AND COMMENTS

What, No Chemist?

AFTER a good deal of rather feverish publicity and a somewhat unnecessary parade of mystery in the House of Commons, the names of eight-ninths of the constituent members of the National Coal Board have been announced. These members, we believe, are unexceptionable in their efficiency and respectability; and anyone who expected a display of fireworks must feel a sense of disappointment. Lord Hyndley, the chairman, is managing director of Powell Duffryn and has an extensive knowledge of the working of coal in its most modern aspects. Sir Walter Citrine and Mr. Ebby Edwards are trade union leaders of the highest repute and ability. Sir Charles Ellis, F.R.S., is fully competent to represent the physicists, as are Sir Charles Reid and Mr. T. E. B. Young the engineers. The records of Mr. J. C. Gridley and Mr. L. H. Lowe, among the merchants and the chartered accountants respectively, testify to their high qualifications for the coming task. We are told, moreover, that a vice-chairman "selected for administrative and organising experience," is to be appointed. But where do the chemists come in? Perhaps they will be expected to take a back seat on the Industrial Consumers' Council, with the inestimable privilege of notifying their conclusions to the Minister, the latter being in no way bound to take any notice. Can it be that the Ministry of Fuel is trying to keep alive the outworn notion that coal is simply something that is (a) dug up, and (b) burnt to provide heat? Are the coal by-product industries regarded as being too unimportant to be considered by the Board? Or is it because their nationalisation yet hangs in the balance that they have no spokesman in this august company? Here are many questions: while still unanswered they leave in our mind a grave doubt whether the problem of our greatest national industry is really going to be tackled as it should be.

More Metallurgists

THIS country must have more metallurgists. The war exposed the shortage to a wide circle of influential opinion, though the fact had been evident in professional circles for a long time. Some practical steps to remedy the deficiency are now being taken, and handsome gifts towards this end have lately been made, one by a combination of non-ferrous metal interests, the other by the Mond Nickel Company, both of which are reported in further detail later on in this issue of THE CHEMICAL AGE. Dr. W. T. Griffiths, chairman of the Mond Nickel Company, reckons that we require about 100 new trained metallurgists every year, whereas before the war the average number in training was only about 30. These figures cover the metal-using industries in the Dominions as well. Official recognition of the problem has resulted in the preparation of a D.S.I.R. report, which is now being studied; its publication should be of the highest interest. The new Mond Nickel scholarships aim at the training of five men of the particular promise during the next fifteen years, and are worth about £700 per annum each. We are glad to note that the terms have been conceived on a broad basis: the selected students are to travel, so that they may study the industry under unfamiliar conditions; both the administrative and the technological sides of the profession are provided for; and it is specially noted that chemists, physicists, and mathematicians are all necessary to a properly balanced metallur-

gical industry. With this, and with the establishment of a Chair of Industrial Metallurgy at Birmingham, the industry would appear to have its sails set for a prosperous voyage.

The Secret Out!

FOR months past, the Press, technical and non-technical, has been trying its best to persuade the Ministry of Supply to release a photograph of the Government penicillin factory at Speke, outside Liverpool, but to no avail. An application made only this week elicited the information that something might be done about this "in two or three months' time." It would appear that there is a strong contingent, at the Ministry of Supply, of the "E.A.W. Boys" (England Always Wrong) —to borrow a quip from the immortal Topsy—for, prominently featured in the first number of a new French scientific journal, *Atomes*, appears a large double-column picture of the factory in the state of completion which it had reached in the summer of 1945! The article, be it said, is no unofficial compilation, but from the pen of Sir Howard Florey himself. We have no quarrel with our French contemporary; rather we congratulate them on their enterprise, and wish them a long and prosperous career. But this is surely carrying the "export drive" to absurdity; and for the British Press to be fobbed off with a casual promise from leisurely officialdom that "something" will be done in a couple of months is little short of an insult to its readers, in view of the fact that there is now no possible, or even plausible, reason for secrecy. The British reading public is becoming too used to this sort of "censorship by default"; and we feel most strongly that suppression of this kind should not be allowed to pass unremarked.

Government Scientists' Grievance

A CAREER in the Civil Service "equal to that of other staffs of comparable quality" has been promised to scientists by Mr. Glenvil Hall, Financial Secretary to the Treasury, in a letter addressed to the Parliamentary and Scientific Committee. "So far from accepting the view," he goes on to say, "that the scientist is inferior to the administrative officer, the aim is to ensure that scientific workers will . . . be in as good a position as other staff." It is further stated that a "pool" of senior posts will be formed, to which individuals will be appointed on their own merits as scientists, and independently of the number of such posts required for the normal work of the department in which they serve. That sounds very satisfactory, but we find it difficult to reconcile with the facts as they stand. According to the aeronautical correspondent of *The Times*, nearly 2000 scientists and technicians have recently been declared "redundant" by the Ministry of Aircraft Production. They complain that this decision has come without warning, before the Civil Service Commission could interview those who had applied for retention, and in spite of official assurances that research work would continue on a large scale. At a meeting of the aggrieved scientists it was urged that consideration should be given to the employment of the existing team on new research work such as chemical, radar, electrical and structural problems of production for civilian use. Mr. Glenvil Hall writes, in his letter already referred to: "You may be assured that the Government will endeavour to remove any injustices that may emerge." It looks as though an injustice had emerged fairly rapidly, and it would be no bad thing for both the Government and the Parliamentary and Scientific Committee to look into the question at once and see what can be done.

Colorado Beetle

"Chemical Warfare" in Channel Islands

COLORADO Beetle, the greatest menace to potato cultivation in Western Europe, threatens the Channel Islands. The beetle gained a hold during the German occupation, and until it is eliminated Jersey cannot export potatoes to England.

The Channel Islands' Department of Agriculture has called in Plant Protection, Ltd., who successfully dealt with Colorado beetle outbreaks in England during the war. The company will apply a beetle-killing chemical spray to the whole of the island's crop, which covers 5000 acres in more than 9000 small plots. In six weeks all early potatoes will need to be sprayed twice and "lates" will require three or more applications.

Senior technical officers have been put in charge of each of the six sectors into which the island has been divided. Specially built spraying machines and a fleet of tractors will be used. In May and June, when spraying reaches its height, a total labour force of 250 will be engaged, including many German prisoners.

Straw Cellulose for Feeding-Stuffs

An Aid in Fighting the Food Shortage

DRASTIC reductions in the food ration for the inhabitants of Germany, coming so soon after Sir Ben Smith's gloomy pronouncements about the world food situation, have brought the question of possible new sources of food supply into greater prominence than ever. Although the condition of the populations of occupied Western Europe was not so near starvation as had been feared,* there is, nevertheless, an undoubted scarcity of vital carbohydrate products, and one way of increasing the quantity of those available for human consumption would be to reduce the amount used as feeding-stuffs for animals, yet, nevertheless, keep the live-stock, instead of slaughtering them without hope of rapid replacement. It has been asked (*see* this journal, March 2, p. 228) whether our technicians have done nothing to develop the manufacture of fodder cellulose; and it is pleasant to be able to reply in the affirmative.

Technical Trials

We have already called attention (*loc. cit.*) to the valuable article published by Dr. H. E. Woodman in *Agriculture* (*50*. No. 7, p. 308), and the matter has now been carried further thanks largely to the investigations and trials carried out at Radcliffe by the East Lancashire Paper Mill Co., Ltd., and English Cellulose Derivatives, Ltd., of which Mr. C. G. Seddon was the moving spirit, with Dr. G. Ullmann in charge of the research department.

It is, perhaps, not without significance of the awareness of our technical men of the urgency of this problem that two new editions of books on cellulose chemistry have appeared within the last month or so; and in the new edition of Marsh and Wood's book (to be reviewed elsewhere in our columns) much fuller treatment has been given to the celluloses derived from lignified plant materials, though this work is addressed mainly to textile chemists.

It is now a well-known fact that during the war cellulose fodder was produced and used in large quantities in the Scandinavian countries, and, according to trustworthy information, in Germany also. Cellulose pulp made from wood in pulp mills was consumed extensively as animal feeding-stuff and went a long way towards helping those countries to keep their stock alive and healthy. The cellulose fodder replaced grain, hay, and other feeding-stuffs which were in short supply owing to the impossibility of importing them, and because of small crops due to adverse weather conditions. In this country we have no large supplies of wood available for cellulose manufacture; on the other hand, considerable quantities of straw are to be had.

The Farm Process

In 1940, I.C.I. were enthusiastically and patriotically engaged in an attempt to introduce on to farms a process consisting of a treatment of cereal straw with cold caustic solution, whereby, after a thorough wash, a semi-pulp was produced having an increased digestibility and a higher feeding value, expressed as starch equivalent, as compared with raw straw. The process resembled one introduced into Germany by Professor Beckmann, of Dahlem, in 1915-16; it was strongly supported by the Ministry of Agriculture in the hope that the scheme might be accepted on the farm. However, for various reasons, the process could not be introduced. Firstly, the harassed farmers were not inclined to occupy themselves with a chemical treatment, and a far from pleasant one at that, dealing as it does with a caustic solution. Further, the process was not cheap, and, more serious still, it produced dangerous effluents with which it was practically impossible to deal satisfactorily. A few months ago Dr. B. A. Southgate, Director of the Water Pollution Research Station, in a paper before the Midland Branch of the Institute of Sewage Purification, mentioned the impossibility of purifying the waste liquors from the manufacture of this type of cattle food.

However, in Germany during the last war, textile mills having normal digesters available were forced to treat straw and other cellulosic materials with caustic solution, in order to produce this kind of fodder on an industrial scale. This effort also was unsuccessful, and for a technical reason which did not become clear until after the war. The failure was due to the fact that the boils, carried out in the manner habitual with textile workers, were made with too low a concentration of caustic solution; so that the natural compounds—particularly lignin—which have a highly depressing effect on feeding value,† remained in the pulp. Animals refused to take the food, and it was a wry joke in those days to say that horses preferred to die rather than be fed with the stuff.

The investigations of the Radcliffe team, under Mr. Seddon and Dr. Ullmann, proceeded on rather different lines. In the first place they tried, not without some

* *See* COLMAN GREEN, this journal, March 2, p. 230.

† *See* PRINGSHEIM, "Chemistry of the Monosaccharides and Polysaccharides," p. 202 (1933).

salutary effect, to split up the farm process into an alkaline pretreatment and a following caustic treatment. This, however, did not remove the objection of carrying out a chemical process on the farm; but it did reduce the cost. Meanwhile they had read in technical journals, particularly from Sweden, that owing to the shortage of carbohydrate feeding materials the Swedish Ministry of Agriculture had bought up large quantities of wood pulp which had become available owing to lack of export possibilities, and that these had been converted in the factory into completely satisfactory "cellulose fodder."

In the Radcliffe process the straw was boiled fully down, and the cellulose content was thus greatly increased, to about the extent of that present in the Swedish cellulose fodder, thus achieving the removal of the depressing impurities—notably the lignin part—which are naturally present in cellulosic materials. The cellulose is practically the only portion which has feeding value, and it is the resultant high proportion of cellulose in the prepared pulp which justified the expectation that such fodder may best serve to feed animals equipped with suitable digestive apparatus. However, the technicians at Radcliffe, being reluctant to draw conclusions by analogy, wished to have definitive evidence whether the cellulose contained in the straw would give the same excellent results as wood cellulose. Naturally, only the animals themselves could give the answer.

Official Support

Accordingly, with the willing support of Mr. Wootton-Davies, then M.P. for the Heywood and Radcliffe division, the doors were opened to the authorities, particularly the Ministry of Agriculture, who already had evidence of the good results obtained in Sweden with cellulose fodder made from wood. Feeding trials in bulk were arranged, and carried out in three of the Ministry of Agriculture's stations, under the supervision of Dr. Woodman, and his article in *Agriculture*, already cited, summarises the results. "That the fibre of the fodder cellulose really consists of non-lignified cellulose," Dr. Woodman says, "was confirmed by the results of digestion trials with pigs. The experimental ration was composed of 350 gm. of maize meal, 700 gm. of middlings, 450 gm. of crude carcass meal, and 700 gm. of the fodder cellulose; the cellulose formed about 32 per cent. of the total ration. No molasses was included in the diet, which was fed and readily consumed. The pigs were able to digest and assimilate 85 per cent. of the fibre in the fodder cellulose, a proof that this constituent consists of cellulose unmixed with any significant amount of lignin.

"It would appear justifiable to conclude from the results of the digestion trials that, provided adequate provision is made in respect of protein, minerals, and vitamins, fodder cellulose made from wheat straw by the paper-making process should be able to replace oats or dried sugar-beet pulp, pound for pound, in the rations of sheep and cattle."

The Economic Side

Dr. Woodman stated that the processes which had then been investigated suggested that the cost of production, and therefore the selling price of the cellulose fodder, would be high in relation to its feeding value, but matters have advanced considerably since 1943; and the Radcliffe technicians have succeeded in manufacturing cellulose fodder at a very low price, at any rate in so far as it is made in connection with paper-pulp production.

It now appears possible, in this country and elsewhere, to produce this cellulose fodder immediately to help in reducing the enormous shortage of carbohydrate foods. Many textile digesters are available, and it appears possible as well to produce additional quantities in pulp mills, while there is evidence to hand that even simpler devices, either already available or capable of rapid installation, could serve the purpose equally well. It is well known that large amounts of cereal straw are available, and if the matter is taken up with the necessary energy, cellulose fodder could be prepared quite soon, yielding about 45 tons of feeding-stuffs from 100 tons of straw. It has also been proved definitely possible to produce alcohol and yeast from the same type of purified pulp. This, however, would require more time to be started, but it is hoped to deal with the subject in a future article.

The use of grain suitable for human consumption to manufacture industrial alcohol or to feed cattle is manifestly unjustifiable in these days; and the replacement of these materials by purified cellulose is surely possible. Not only in Britain, but also on the Continent of Europe could this method be employed to supplement animal feeding-stuffs, and aid in mitigating the grain shortage. In his Press conference last month the Minister of Food was asked whether he was aware of the possibility of replacing from other sources the millions of tons of wheat of which the world is short. His answer was reported as being: "If it could be made up from any source at all, nobody would be happier than this Government."

Cellulose fodder means keeping livestock by feeding them with something other than grain, etc., which is to be consumed only by hungry mankind. For this reason President Truman has forbidden, or at least rigidly restricted, the feeding of animals with anything suitable for human nutrition.

SAFETY FIRST

Safety Considerations in Plant Design—II

by JOHN CREEVEY

IT occasionally happens that some of the advantages of the technical performance of chemical plant are offset by inconvenience or awkwardness of operation. Such faults must be traced to the designer. I do not refer to any of those self-contained pieces of equipment providing for a particular operation, such as size reduction, filtering, evaporation, or one of the many other unit operations essential to processing, but rather to complete processing plant incorporating various individual unit operations. Nevertheless, the same faults may be found in multiple assemblies of one and the same unit operation, the cause often being due to the adaptation of plant of defined capacity to suit available floor space and headroom. This is emphasised particularly in plant of tower-like form, even anything in the nature of towers used for distillation or for absorbing or scrubbing gases or vapours.

When considering floor levels, the designer may either adjust his design to suit the floors of an existing building, or put the needs of the plant first and foremost, especially when a new building has to be erected. It may be advantageous to alter the ideal functional dimensions of the plant to suit existing floor levels. Alternatively, it should be remembered that the building is essentially a scaffolding giving access to different parts of the plant, not only for operation, but for maintenance, and that it carries any necessary protection against the weather.

Building Design

In designing a building to suit the needs of the plant, much can be done to reduce common accidents to the minimum. For example, careful consideration should be given to the placing of stairways, ladders and hatches, also to the position of any hoist, elevator, or conveyor for inter-plant movement of material. Not only must safety railing surround platforms above ground level, but it must be sufficiently high to protect any worker on the platform. Toe boards at platform level are desirable, not only to prevent tools from falling, but to give a feeling of security for the feet when the eye is otherwise engaged in plant operating duties.

In any plant essentially concerned with bringing an ascending gas or vapour into intimate contact with a descending stream of liquid, one central control station for operating all valves is desirable. Such valves may have to be opened or closed or merely throttled in co-ordination to give the optimum conditions between the two phases passing in countercurrent in the tower, and any haphazard arrangement for operating the valves by means of extension handles, levers, or any other recognised means, may cause confusion serious enough to bring about an accident. In every case where there is remote control, an indicator should be placed near each handle, lever or switch gear to show the operator just what is happening when that handle or lever is moved. This indication may be direct, such as a pointer moving over a scale—a mere mechanical device functioning co-operatively with the handle or lever, and showing the directional result of any movement; alternatively, it may be resultant indication, such as a thermometer showing the rise of temperature when a valve is turned to admit steam or to cut off cooling water.

Centralisation of Control

For intricate plant, centralisation of every aspect of control at one point or control station is desirable. Here, the immediate response to turning a valve should be visible even while the valve is being turned, so far as this may be achieved. Such methods of watching and controlling a process need not become unduly complicated; an even balance of commonsense should ultimately decide whether or not some simpler means could be adopted for watching and controlling any particular factor entering the reaction. For instance, the reading of a distant thermometer or pressure gauge can be aided by a small telescope permanently mounted and focussed. If the reading of either thermometer or pressure gauge is most essential before a certain valve is turned, that valve may be so arranged as to be locked against movement until the telescope is turned into position for use. Such an arrangement serves as a reminder that the distant instrument has to be read.

Possible disastrous results of awkward or clumsy operation of chemical plant need minimising. This feature of design has often been neglected. Again considering the case of a tower-like construction where gas or vapour are passing in countercurrent with liquid, it can happen that control of the plant is lost by the mere entrainment of a large amount of liquid caught and carried off in the ascending stream of gas

or vapour. This trouble is commonly due to inattention in supervising the smaller details of operation. To avoid disastrous results, a disengaging device for the entrained liquid must be provided. If operating pressure demands sensitive means of control, the necessary needle valves should be supplemented by anticipatory pressure indicators. The contingency that the operator may suddenly fall ill has also to be considered. Whatever is most likely to happen first in the subsequent functioning of the plant may, perhaps, be avoided by fixing some automatic safety device, such as a spring-loaded safety valve. As it is also possible that the spring-loaded safety valve may not function (because of bad maintenance, for instance), an additional safety feature is suggested in the shape of a disc designed for bursting at some predetermined pressure. The bursting disc is so simple in construction, and normally so foolproof in operation, that it provides an excellent means for obtaining safety where hazardous internal pressure is involved.

Blockage of Nozzles

Spray nozzles in a tower of the type already instanced are liable to suffer blockage if there is likelihood of the presence of tiny solid particles in the stream of liquid. To avoid this, the liquid fed to such nozzles should pass through a strainer sufficiently fine in mesh to hold back all particles of a size likely to cause trouble. To be efficient, strainers must be easily accessible for cleaning. Regular inspection of all devices requisite to safe operation is important for ensuring rigid attention to maintenance.

It is of great advantage to the designer to gain experience by understudying a maintenance man. Low over-all costs of maintenance, which result from certain features of design, are better thought out as the result of practical maintenance experience than otherwise. Better knowledge of the restrictions of any confined space can be gained by the designer if he cuts out a little paper man, correct to scale, for the purpose of trailing him between interlaced masses of pipework, as well as around awkward corners.

Just as convenience of access must be regarded as an important feature of design, so are we to be reminded of other common-sense things. Almost any tall piece of plant of the liquid-gas contacting type has certain places where liquid will accumulate whenever the plant is shut down. These accumulations, if they cannot be avoided by refinements of design, can be removed by means of built-in syphons or drains, purged away if need be, without risk of coming in contact with platforms, pipework insulation, or small fittings likely to suffer injury. Such accumulations of liquid may be corrosive or fuming or may even give off poisonous vapour. Moreover, if at any point above ground level there is risk of liquid emerging when a manhole or inspection door is opened, or while removing a flange or fitting connected with the internal system of the plant, it is wise to have the platform at that level provided with a deep water-tight curb to catch the leakage and pass it direct to a drain. Such water-tight curbs have also proved useful on plant where products of high monetary value are being handled, because they allow useful salvage of any leakage or unavoidable drainage.

Bolted joints call for more detailed attention on certain types of plant. Where there are high pressures and temperatures, or where the fluids are of explosive or lethal nature, the bolted flange joints should be made up with metal or metal-jacketed gaskets held firmly in place by grooves or recesses cut in the face of the flanges. When bolted-down equipment must remain tight against vibration, there is definite advantage in using foundation bolts of extra length, the excess being taken up by pipe spacers. These bolts hold more tightly than those of the length actually needed and normally used, because they stretch slightly and have more resilience. Such foundation bolts do not fracture from effects of crystallisation at the root of the screw thread. Cork and rubber may also be used to absorb vibration, but here it is a wise precaution to make electrical contact with the earth to avoid trouble should there be accidental leakage of current from an electric motor somewhere on the plant, or when moving machinery is liable to build up a static charge.

Fellowships in Metallurgy

Mond Nickel Co.'s Gift

DR. W. T. GRIFFITHS, president of the Institute of Metals, announced last week that the Mond Nickel Company, of which he is chairman, had offered £50,000 to the five metallurgical institutes—the Iron and Steel Institute, the Institute of Mining and Metallurgy, the Institute of British Foundrymen, the Institute of Metals, and the Institution of Metallurgists—for additional special training of metallurgical students. This gift will enable awards of at least five substantial fellowships to be made annually for the next 15 years.

The purpose is to assist the speedier and fuller application to industrial practice of the results of pure research. If the donor's suggestions are accepted, the fellowships will be used to provide opportunities to study the industry in other countries, for training in administration, or for the study of industrial economics, or some other aspect of business or industry.

LETTER TO THE EDITOR

Insecticides

Sir,—Why is it that about this time of the year we get much information, mostly garbled, on what the new insecticides have done and will do? Is it, perhaps, because the sales managers and their back-room boys are sharpening their pencils, preparatory to the opening of the new season? Or do they just look for heads to hit as and when opportunity offers?

I live in Kent where I grow hops and fruit, two products which seem to be more subjected to the attacks of insect pests than are general products grown in other parts of the country. We Kentish farmers have to have good insecticides to protect our crops and naturally we try all the latest ones.

Mr. G. Colman Green, who contributes so much to The Chemical Age, is obviously a gentleman who collates and collects information on drugs and fine chemicals, and puts out his information in a condensed form for the benefit of his fellow chemists. All very proper and right, but his recent (The Chemical Age, March 2) collection of comments on insecticides illustrates how dangerous this method of passing on information can be, unless the collector is aware of the fact that much of what passes as scientific data in the literature is but light-hearted propaganda.

Mr. Green cannot be speaking from his own experience when he says that "Gammexane is more effective towards the troublesome grain weevil than any other known insecticide." DDT, he asserts, "is said to have only one-fifteenth of the action of Gammexane against the grain weevil." He is merely repeating the claims of an employee of the firm manufacturing Gammexane. At the time of Dr. Slade's paper I protested against these claims (which may have arisen as a result of but few experiments) in your columns and advised the manufacturers of both Gammexane and DDT to await further experimentation.

Conclusions from Tests

I have, during the past 12 months, tested both DDT and Gammexane and have no hesitation in saying that to say that DDT has only one-fifteenth of the action of Gammexane against the grain weevil, is nonsense. I will go further and say that if DDT is treated with an activating material it can be made 100 per cent. effective against the grain weevil, and only a 100 per cent. effective insecticide is of any use against the grain weevil, because if you leave alive only 25 per cent. of a given infestation then this 25 per cent. will multiply and you are no better off.

The next thing which struck me in Mr. Green's attack on DDT was his statement "that it had been found to be highly toxic to man during the past 12 months when injected *per os* or percutaneously in an organic solvent," and goes on to say "this is not unexpected in the light of information previously collected from animal toxicity experiments." Is it too much to ask to what information he is referring, and by whom it was collected? Could it have been put out by the makers of competitive insecticides? He does not say. He then goes on: "For the first time a death and very severe toxic symptoms have been reported." I presume he is not speaking of the same case, but of two different ones. I think I can identify them from reports which appeared in the *Pharmaceutical Journal*. I endeavoured to investigate these reported cases of poisoning by DDT, but was utterly unable to find any evidence that there had actually been a death from DDT poisoning. The case appeared to rest upon the report of a doctor that he had heard that a case of death from DDT poisoning had occurred in some town, the name of which he had forgotten.

A Non-existent Chemist?

Then there was the case of the chemist employed in a works manufacturing DDT, who, so it was said, had rubbed his hands in the substance dissolved in an organic solvent and had promptly gone down with the most astonishing symptoms that anyone had ever heard of. Inquiry at the works of the only firms known to be manufacturing DDT failed to reveal the name and address of this unhappy man. Perhaps he will come forward, but until he does I for one refuse to believe he ever existed.

As a farmer I am not impressed either by Mr. Green's statement that Levis and Richards had investigated the toxicity of DDT against hanging-drop cultures of various chick-embryo tissues, or that emulsions of DDT "gave a high rate of kill in from 45 minutes to 76 hours when injected into mice." Nobody, I hope, contemplates going round with a hypodermic needle nobly trying to stick DDT into an insect, and, having missed, getting a mouse with it. I can only say that if there was any danger in working with DDT, then many of us who have been using it in field work would be dead to-day.

I have had full-strength DDT blow into my eyes and have had to wash it out with an eye-bath containing plain water, without any ill effects beyond a somewhat inflamed eye. My hands have been frequently immersed in solutions of DDT in organic solvents, yet I have never experienced any of the symptoms described by the chemist who was supposed to have had nervous reactions after a little DDT and benzene had dried out on the back of his hand. I have had DDT both in emulsion form and in powder form in cuts on my hands and

arms when I have been using it. I have swallowed DDT accidentally, and beyond the fact that it leaves a most persistent taste in the mouth I have suffered no ill-effects, although I cannot recommend it as a steady diet. The crowning test came when one of my men administered a drench of DDT in water to a cow in mistake for M. & B. I assume that she had nearly ½ lb. of it, but as far as I could tell she suffered no ill-effects beyond not being very keen on her food for a few days. My dogs, sheep, and fowls have had quite strong DDT powder dusted upon open cuts and sores, with but little discomfort to them, but with fatal results to the parasites they harboured.

Activated DDT

There can be no question of the efficacy of DDT, particularly the activated type (made by the Acme Chemical Co., of Ashford, Middlesex). This kills green-fly and caterpillars, against which standard DDT is not too good. Activated DDT powder is completely effective against lice on hops, and this year I have decided to cut out all winter and summer washes and use the powder in my apple orchards to control weevil, codlin moth, and caterpillar. I have not yet used Gammexane on a large scale because my wife objects to the smell of it in the house and in the barns, but I notice that my neighbour who used it last year in connection with the control of weevil in his Kentish cobs is this year using DDT.

You will recall that one of the Agricultural Colleges in Wales carried out some experiments on the use of DDT in sheep dip and described it as being very successful. I was anxious to try it for myself and wrote to them to inquire how they applied it; in other words, what vehicle they used. Believe it or not, I received a reply that they were not allowed to tell me, as it was a secret which was the property of the Ministry of Agriculture. As you, Mr. Editor, well know, since I showed you some in 1945, I was able to find a vehicle which I obtained locally and I used DDT in a sheep dip and found that, provided the sheep were dipped before the fleeces had been damaged by fly, they were immune for the rest of the season, and it was no uncommon thing to find dead blow-flies in the fleeces. Yet the scientists employed by the Government to advise the poor simple farmer refused to tell me how best to use this marvellous remedy against one of the greatest curses of the sheep farmer.

Chemists ought to be made to work on the land with the stuff they sell. I wonder how they would eat their meagre rations after a day in the hot sun dipping sheep in an arsenical bath. Would they, I wonder, vomit as I have seen my men do? Would they run to pick up weakly sheep that drop on the road, after an arsenic dip? Have they ever seen the weak and enfeebled physique of the labourers who work constantly with nicotine dusts in the hop gardens, where even the old horse, used to draw the sulphurator, bleeds at the nose and stands trembling at the end of a row, before starting back into the cloud of nicotine dust? Even the invented horrors of DDT are as nothing compared with the realities of arsenic and nicotine.

You are probably wondering why I write all this. I cannot put it into the staid and formal language of Mr. Colman Green and the various advocates of different insecticides, but what I feel is that these chemists and scientific men are wasting too much time on finessing and manœuvring for position and are taking advantage of the fact that they are able to confuse the ignorant layman with high-falutin talk about "inositols" and the "bios complex," with the idea of persuading him against using other remedies than those they suggest, so that every new discovery is surrounded by a cloud of words and it takes years for the simple man to determine what the truth is. If I felt that their reluctance to furnish us with reliable information was due to caution or to save us from possible dangers, I could not and would not object, but DDT has now been used on millions of people without ill-effects, yet we still have the same old re-hash of toxicity rumours.—Yours faithfully,

F. N. Pickett, M.I.Mech.E.

Tenterden, Kent.
March 6.

A.P.V.'s Indian Company

Plans for Chemical Plant

The Aluminium Plant and Vessel Co., Ltd., of Wandsworth Park, London, S.W.18, has formed an Indian subsidiary company, known as the A.P.V. Engineering Co., Ltd., which is now responsible for dealing with Indian inquiries for all A.P.V. manufactures. These include equipment in aluminium, stainless steel, and copper for the dairy, food, brewing, paint, and fruit juice industries; transport tanks; and distillation and other plant for the chemical industry. At present all inquiries should be addressed to P.O. Box 2492, Calcutta. Limited production facilities will be available, but more extensive facilities will be provided when machinery, on its way from this country, has been installed. The intention is to manufacture all the more bulky products in India, but the specialised products are sent from this country.

What is described as a "soapless soap" is now being marketed by a number of U.S.A. chemical firms.

Chemical Works and the Factories Act

I. General Arrangements

by B. S. DYER, B.Sc., A.R.I.C.

THIS series of articles has been written with the purpose of providing an introduction to an understanding of the requirements of the current Factories Act and similar legislation applied to chemical works. The influence of chemists and chemical engineers is progressively expanding into managerial and non-technical spheres, and it is increasingly important that they should possess a sound knowledge of the related legislation. To the recently-graduated chemist, the realisation of the broader responsibilities of a managerial post appears to accentuate his inadequacy of knowledge in this direction, and it is felt that this account may be of use to such chemists.

A considerable number of persons who are legally responsible for certain requirements under, say, the Factories Act, appear to be completely oblivious even of its existence. In too many factories at the moment it seems that divided responsibility in these matters leads to complete neglect of the requirements, and all too often it is left to the factory inspector to point out discrepancies, in the hope, of course, that too much will not be seen by him. It is unlikely that the factory inspector can be familiar with the details of all processes carried out in all the factories in his district, and he can never be in such a good position in this respect as the person in charge of the work. It is an unsatisfactory state of affairs to wait for legal proceedings to point out infringements associated with, perhaps, a fatal accident.

Relevant Legislation

It is not proposed to attempt to cover the whole of the legislation provided; indeed, that would be impossible in such an article. In the author's experience, relevant legislation applied to chemical works may be divided into two classes: (a) that which is entirely the responsibility of the owner or occupier, and not normally delegated to the technical staff; and (b) that which is predominantly associated with the day-to-day responsibility of the technical management. In class (a) may be placed those requirements which in the normal course of events would be carried out by the clerical staff, possibly with the assistance of expert legal advice. It is, therefore, not proposed to deal in detail with this class, but rather to point out the sections of legislation under class (b) with which the works chemist should be familiar.

Before dealing with specific requirements, it is as well to consider briefly the development of factory legislation in order to appreciate more fully the spirit of the requirements. Before the Industrial Revolution working conditions were mainly fixed by the worker himself in his own home; but when the organisation of many workers into a single unit took place and the direction of this group came under the control of an employer, the conditions of work became such that legislation was necessary to avoid undue exploitation. It may therefore seem unnecessary to emphasise the fact that almost all the legislation is directed towards improving the working conditions (health, safety, and welfare) of the employees, but it appears that this is frequently overlooked in enforcing the regulations within the factory. Particularly is it strange to appreciate the difficulty of convincing workers of this fact: unless the requirements of the Act are put to them in a reasonable way with the right type of propaganda, they appear to prefer to take risks which often have undesirable consequences.

The First Acts

The first Factory Act, which became law in 1802, dealt with the conditions of apprentices; further, and progressively more comprehensive Factory and Workshop Acts were passed in 1878, 1901, 1929, and 1937. Unless otherwise stated, reference to the "Factories Act" will mean the latest Act of 1937.[1] In view of the reasons for this legislation, it is only logical to find the largest number of clauses, and the most detailed requirements, relating to those trades and occupations in which there has been the greatest abuse, and especially to those in which women and young persons are employed.

Until comparatively recently—June 7, 1940—the authority for enforcing the relevant Act was vested in the Secretary of State and administered by the Home Office through the factory inspectorate, but on that date the powers were transferred to the Minister of Labour and National Service as an amendment to the Defence (General) Regulations, 1939. The Factories Act of 1937 consolidated much of the legislation already in existence and is based on wide experience accumulated in administering the previous Acts. It will readily be appreciated how difficult it is to make an Act which is general enough to cover all factories, and yet which at the same time is detailed enough to give specific direction for each type of work. This difficulty is overcome by making the Act itself as general as possible and conferring on the Minister

power to grant exceptions from the Act and to make Rules, Regulations, and Orders relevant to it. Thus, many sections of the Act have subsequently been amplified and made more explicit, especially with reference to particularly hazardous industries. These regulations are gazetted in the same way as other similar legislation, as Statutory Rules and Orders, each being distinguished by a number relating to its particular year of publication; thus the "Operations at Unfenced Machinery Regulations 1938" are S. R. & O. No. 641 of 1938. In addition, certain sections of the Act empower the Chief Inspector of Factories to grant certificates of exemption from specific requirements as he may consider necessary. This arrangement then allows legislation to be adjusted to modern standards of working without the necessity of direct amendment of the Act, which would be a comparatively slow process.

Factory Orders

All regulations, orders, and certificates of exemption in force relating to factories are consolidated yearly in the publication *Factory Orders*,[2] compiled by the Ministry of Labour and National Service. It will be noted on perusal of this publication that a considerable number of regulations published prior to the 1937 Act are still in force, due to the fact that this was largely a consolidating Act. Of these, probably the most important to the works chemist are the Chemical Works Regulations, No. 731 of 1922, gazetted July 14, 1922. It is suggested that copies of the Factories Act of 1937 and of the current Factory Orders are indispensable works of reference for every works chemist.

It is not proposed to deal with other Acts, such as the Workmen's Compensation Acts, although it is important that the works chemist should have some knowledge of them also; rather, this discussion will be confined to the sphere covered by the Factories Act, in which the direct responsibility of the works chemist or technical manager is involved. That the scope of the Act is extensive may be seen from the official definition of a "factory" given in Section 151, the main provisions of the Act, with a few minor exceptions, applying equally to Government factories. Of particular interest to the chemist is the fact that routine laboratories whose work is associated with that of the factory are to be regarded as a part of the latter, although research laboratories are not so included.

Responsibility of Managements

Although the finer requirements of the Act and the relevant Regulations can perhaps only be interpreted unambiguously by someone with a legal training, the chemist may acquire a number of examples of official interpretation from the study of previous legal proceedings arising from the Act. A good source of information is contained in the summaries of such cases published in the *Industrial Accident Prevention Bulletin*.[3] It will be seen from this study that the onus for enforcing the Act is placed on the owner or occupier of the factory. A further source of information relating to safety measures and of value to the chemist in enforcing the requirements of the Act, is the publication *Safety Rules for use in Chemical Works* by the Association of British Chemical Manufacturers.[4]

In the normal factory set-up, the company is represented by a series of officers in charge of particular sections, and their responsibilities are clearly laid down in Section 131 (5), which provides that . . . "where an offence under this Act committed by a company is proved to have been committed with the consent or connivance of, or to have been facilitated by any neglect on the part of, any director, manager, secretary or other officer of the company, he, as well as the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly." It therefore behoves every such officer to be familiar with the sections of the Act which directly concern the operation of that part of the factory under his control.

Responsibility of Workers

It should be emphasised, however, that the worker himself has also a certain responsibility under the Act. Section 119 (1) provides that the worker shall use any means or appliance provided for his health or safety, and shall not . . . "wilfully interfere with or misuse any means, appliance, convenience or other thing provided in pursuance of this Act." Section 119 (2) provides that the worker shall not . . . "wilfully and without reasonable cause do anything likely to endanger himself or others." In order to make the average worker appreciate the implications of this section, a considerable amount of propaganda is necessary. The difficulty often lies in making the worker ununderstand that particular actions are, in fact, dangerous; he has perhaps been allowed to carry out an operation in a particular way for many years and no accident has occurred. Continued familiarity certainly breeds contempt in these matters, and particularly in handling chemicals on a large scale. It is obviously too late for, say, a worker to begin wearing goggles after he has lost his eyesight through an acid splash in a job which he has carried out successfully many times, but in which the possibility of an accident was always present. It is the duty of the works chemist and foreman to foresee such occurrences and to insist that all possible precautions are observed.

The records of legal proceedings indicate

that despite the responsibility of the workers in these matters, the company, and therefore also the technical manager, is responsible for seeing that workers do not contravene the requirements of the Act. As a classic example may be cited the case of an accident to a worker operating a guillotine, the guard of which had been removed by himself for easier operation. Although at first sight the worker appears to be responsible under Section 119, the company was convicted for not ensuring that the guard was a fixture and for insufficient supervision to ensure that the guard had not, in fact, been removed.

In the continuation of this series, it is proposed to deal briefly with those specific sections of the Factories Act which most closely concern the works chemist or technical manager, and to link them with the relevant amplifying Factory Orders.

REFERENCES

[1] Factories Act, 1937 (1 Edw. 8 & Geo. 6, Ch. 67: 30/7/37). (H.M.S.O.: 2/6.)
[2] Current publication is *Factory Orders*, 1944 Edition. (H.M.S.O.: 5/-.)
[3] *Industrial Accident Prevention Bulletin* produced by the Royal Society for the Prevention of Accidents, and issued by the Ministry of Labour and National Service at about three-monthly intervals.
[4] *Safety Rules for use in Chemical Works*, Association of British Chemical Manufacturers (1938).

Carbide Syndicate

Report of an International Revival

ACCORDING to a Swiss Press report the International Carbide Syndicate which, like other international organisations, disintegrated at the beginning of the war, is likely to be revived. This presumes, however, that a possible agreement can be found between the various producers and especially between the Governments involved. Before the war the syndicate consisted of all the European carbide-producing countries: Norway, Sweden, Switzerland, Germany, France, Yugoslavia, Italy, Belgium, and Holland, while a special agreement existed with the United States. Only Soviet Russia and Japan remained outside this organisation, which settled the price as well as the selling quota for export. But the situation of the international carbide market has changed considerably in consequence of the war; South American and other countries, which formerly covered their requirements of carbide from abroad, have established their own carbide works and made themselves independent of imports. Great Britain, once the most important buyer of carbide, has also realised her plans for the establishment of her own works, which were prepared before the outbreak of the war, and made herself independent of imports. Although it was originally intended to cease this home production after the war, since it would hardly be economic, the Government has now decided to increase the carbide output, so that Great Britain in future is likely to withdraw very largely from the foreign market.

In such circumstances it is not surprising to learn that the works of A/S Hafslund, near Sarpsborg, one of the four large Norwegian carbide plants, with more than 300 workers, has decided to close down. This is not only in consequence of the shrinking of the export market but also because of difficulties in obtaining the necessary electric energy. Before the war Norway was the largest carbide producer of Europe, her production amounting to 53,000 tons in 1936 and even in 1940 to 27,300 tons. These quantities were mainly exported, Great Britain being always one of the principal buyers. In 1938 the export figure reached 44,800 tons, of which not less than 42,500 tons went to Great Britain, while in the first nine months of 1945 only 2350 tons (against 6285 tons for the whole of 1944) were exported. The three remaining Norwegian carbide works are likely also to show a similarly reduced production figure.

The largest Swedish carbide plant, the Stockholms Superfosfatfabriks A/B, is at present in full production as far as sufficient coal is available. It is characteristic of the situation that no export licences have yet been granted, although before the war Sweden had a notable carbide export, amounting to 9330 tons in 1938, of which Great Britain and Argentina consumed about one-third each.

BRITISH INDUSTRIAL PLASTICS

In their annual report, British Industrial Plastics, Ltd., announce a trading profit of £280,681 (£240,107)—the net profit and dividend were reported earlier (p. 222). It is stated that the demand for moulding powders is still far beyond the capacity of the company to supply, although production has been greatly expanded and should continue to increase. Others of the company's products are also in heavy demand for new uses in several basic industries, and as these demands are not merely permanent, but likely to multiply, the directors have purchased seven acres of land at Oldbury, including a large factory building adjoining the existing factory, for the purpose of the necessary extensions.

Exports of potash from Germany in 1946 are estimated at 100,000 tons, to be delivered in batches of 20,000 tons. Manufacture of nitrogenous fertilisers is scheduled as follows: Russian zone, 5500 tons; French zone, 1000 tons; British zone, 4000 tons; American zone, 200 tons.

A CHEMIST'S BOOKSHELF

An Introduction to the Chemistry of Cellulose. By J. T. Marsh and F. C. Wood. (3rd Ed.). London: Chapman & Hall. Pp. 500. 32s.

It seems but a short time since we had the pleasure of reviewing the second edition of this well known work. That a third edition has been called for after a lapse of only three years is evidence that the work has found a worthy place in the rapidly expanding literature of cellulose chemistry. The scheme of presentation of this volume is essentially the same as that adopted for its predecessor. Opportunity has been taken to incorporate new knowledge here and there and a notable expansion of the text has been made in order to allow a fuller treatment of the celluloses derived from lignified plant materials, such as straw and wood, which received scant treatment in the earlier editions. The book is written by well-known exponents of textile science and is expressly intended "as a guide to the younger chemists who are entering those branches of our great industries which are concerned with cellulose." It is to textile scientists that the work, as a whole, will appeal most, but Part V on the derivatives of cellulose will be valued by a much wider public.

Part I deals with the occurrence and general properties of cellulose. The text is liberally supplemented by photomicrographs and diagrams illustrative of the growth and physical structure of five types of industrially important cellulosic materials. A useful table giving the general composition of these representative raw materials is included. The purification of cotton is described in some detail and a brief account is given of wood pulping processes and the bleaching of wood pulp. In discussing the general properties of cellulose, prominence is rightly given to moisture relations and, in this connection, a new and informative section is included on the beating of pulp.

Many readers will regret the statement on p. 64 that the time has not yet arrived for the publication of detailed information on the creasing properties of cotton. To some extent amends are made for this later on in the work by a few remarks on the crease-resistance of fibres in general. "The production of crease-resisting cotton and rayon by forming certain synthetic resins *in situ*" is still regarded by the authors as strictly outside the scope of cellulose chemistry and the subject is, therefore, not discussed as, perhaps, only these authors could discuss it.

The authors allow themselves sufficient latitude in Part II to include, under the general heading "The constitution, molecular weight and molecular structure of cellulose," a most interesting chapter on the structure and properties of a range of substances such as nylon, alginates, chitin, silk, wool, and regenerated protein, which are demonstrably not cellulosic. They all have at least two features in common with cellulose, however, in that they are composed of chain macromolecules and find application in the textile field. The remainder of this section treats the evidence relating to the molecular weight and structure of cellulose in a manner which leaves little to be desired. The illustrations are excellent. Opportunity is taken to point out that although, hitherto, considerable attention has been devoted to the cellulose crystallite, the highly-orientated regions in cellulose do not characterise the material from all points of view. "There are now indications that more notice will be taken of the amorphous regions."

In Part III detailed consideration is given to the dispersion of cellulose by bases, by hygroscopic substances, and by specific reagents such as cuprammonium hydrate. Fluidity and its measurement are fully treated, while properties such as the affinity for dyes and the moisture relations of dispersed cellulose are discussed, accompanied by a series of X-ray diagrams providing evidence of structural changes induced by mercerisation. Part IV deals with modification by treatment with acids, leading to hydrocellulose, and by oxidising agents, leading to oxycellulose of which two distinct types are identified. Reference is made to recent American work on the oxidation of dry cellulose with dry nitrogen dioxide.

In *The Chemistry of Cellulose*, by Emil Heuser, which we recently reviewed in these pages, considerable prominence is given to the detrimental effect of ultra-violet light on cellulosic materials. In view of the interest this subject must have for both manufacturers and users of textiles, it is surprising that the authors of the present volume have not devoted more than a brief mention to it.

There can be nothing but praise for Part V of the work, which deals very effectively with a wide variety of cellulose derivatives. The information, much of which has been obtained by careful examination of patent specifications, is presented in a concise and interesting manner. Reference is made to the recent development of water-soluble cellulose acetates, while a very full account is given of soda cellulose and of the viscose process. The concluding "General Considerations" may be interpreted as a summary of the authors' outlook on cellulose and the modern trends in its technology.

The Aluminium Company of America has placed an order with a New York shipyard for a ship with an aluminium hull. The vessel will carry bauxite from Dutch Guiana to the United States.

Parliamentary Topics

Antiseptics

IN the House of Commons last week, Colonel Stoddard Scott asked the Minister of Fuel and Power whether he was aware that under Section 85 of the Coal Mines Act, 1911, 2 per cent. alcoholic solution of iodine, or other antiseptics approved by the Board of Trade, must be available for first aid underground; and, as other and more modern antiseptics than iodine are available on the surface, what modern and more efficacious antiseptics had the Board of Trade approved for use underground.

Mr. Shinwell: No alternative antiseptic to iodine has yet been approved for use underground. Practical trials are, however, being made to determine the effectiveness and general suitability under those conditions of other forms of antiseptic, and the position will be reviewed when the results of the trials are known.

Silicosis in Tin Mining

Mr. Beechman asked the Minister of Fuel and Power whether he was taking steps to assist research into protective measures against silicosis in tin mining.

Mr. Shinwell: I have arranged to co-operate in an investigation recently started in Cornwall by the Medical Research Council. This investigation, so I am informed, will include X-ray examinations of men employed in tin mining and tests to determine the preventive and curative effects of inhaling aluminium powder.

Linseed Oil

Mr. Drayson asked the President of the Board of Trade why the allocation of linseed oil for incorporation in paints, varnishes, and enamels for the export trade is at present only 18 per cent. of the quantity required to execute orders that are in hand.

Mr. Belcher said there was a large and expanding demand for paint for housing and other essential purposes in this country, including the painting of highly manufactured goods destined for export markets. He was therefore afraid that the special allocation of linseed oil to the export group of the paint industry, which was increased last autumn, could not be further increased at present.

Leather Chemistry

Colloquium in Manchester

A WELL-ATTENDED meeting of the Manchester Group of the British Section, International Society of Leather Trades' Chemists, was held on February 16 at the Engineers' Club, Manchester, when Dr. D. Burton, M.B.E., F.R.I.C., held a colloquium, and made reference to the famous ones held by Professor Stiasny, with the hope that the Group would maintain their tradition.

The first subject for discussion was the "Functions of Acids in Vegetable Tanning." Dr. Burton gave a picture based on X-ray diagrams, photomicrographs and the sizes of tannin particles, with measurements in Angstrom units. The mechanism of plumping was then discussed with special reference to the importance of the effect of salts; also the relations between the extent of plumping, the *p*H and the acid content of the liquor on the amount of tan fixation, the limitations of *p*H, and the effects of salts. The last question was: "What characteristics should the tannin molecules have to get maximum fixation?"

Constituents of sulphated oils and the part they play in fat-liquoring and oiling off sole leather provided a second subject for discussion. It was generally agreed that works tests and examination of the emulsions give more information than analyses. There was a lively discussion on the question of whether there is any combination between sulphated oils and vegetable leather, the way in which an oiling-off oil behaves when applied to leather, and the possibility of new oils, such as the phosphorated oils.

FRENCH COLONIAL MINERALS

According to recent reports from France, minerals derived from the French Empire are playing an ever-increasing rôle in the rehabilitation of Metropolitan France. It is estimated, for instance, that beryllium requirements of the light metal industries will total about 500 tons this year, calling for an intensification of beryllium-ore mining operations in Madagascar. As regards graphite production in Madagascar, sales amounted to about 6000 tons last year, equal to about one-half of the pre-war level. This decrease is said to be mainly due to falling off in British purchases owing to high prices. Nickel production in New Caledonia went on uninterruptedly during the war, output being reserved solely for French needs. Stocks of chrome in the island amounted to about 40,000 tons on October 1, 1945, and have since then been shipped to France, the United States, Sweden, and Norway. Exports of lead from French Equatorial Africa will be resumed with the completion of the railway line linking the Mfouati mine with the Congo-Ocean railway. Annual output amounts to 80,000 tons of mineral of 53 per cent. lead content. There is a considerable demand for rutile from the French Cameroons. Production of Senegal ilmenite amounted to roundly 4500 tons last year, sufficient to cover metropolitan requirements.

New Control Orders

Sulphur Prices Reduced

FULL details have now come to hand concerning the Control of Sulphur (No. 5) Order, 1946 (S.R. & O. 1946, No. 302) which revokes the corresponding Nos. 1 and 2 Orders, and reduces the maximum prices of sulphur ground from crude sulphur by 25s. per ton.

The preliminary statement included in our last issue as we went to press (p. 272) should be revised as follows: for lots of not less than 4 tons, delivered at producer's works, per ton, ground but not sieved or graded. £14; sieved or graded, according to mesh (under 120 to over 200 mesh), £14 15s. to £16 5s. Extra charges for smaller lots up to 12s. 6d. per ton for lots less than 6 cwt., but not less than 2 cwt.

Digest of Statistics

The Second Issue

THE latest figures contained in the first issue of the *Monthly Digest of Statistics* (H.M.S.O., 2s. 6d. net)—a review of which appeared in THE CHEMICAL AGE last week (*see* p. 253)—related chiefly to the month of November, 1945. Those for December are embraced in the second issue, published this week. In some instances figures for January are also given.

The estimated number of people employed in chemical, explosives, coke-oven and by-product works (figures in thousands) declined from 249.0 in November to 238.4 in December, 95.3 being female workers. There was also a decline in the numbers employed in the iron and steel industry, from 191.5 to 189.5. The numbers employed in the manufacture of non-ferrous metals was almost the same as in November—78.4, as compared with 78.9. Another figure remaining almost static was the total of people employed in making scientific instruments—64.0, as against 64.9.

The raw materials section shows that production of iron ore dropped from 249,000 tons in November to 231,000 tons in December, but rose in January to 245,000 tons. Pig iron output, however, showed a progressive drop, the respective figures for the three months being 150,000 tons, 145,000 tons, and 144,000 tons. Figures (in thousand tons) for virgin aluminium production reveal an increase from 2.48 for November to 2.61 for December, while consumption dropped from 7.9 to 5.9.

The production of sulphuric acid (in thousand tons) rose from 145.2 in November to 153.9 in December; that of superphosphate dropped from 81.8 to 76.0; and that of compound fertilisers from 110.7 to 97.9. Consumption of pyrites (again in thousand tons) went up from 16.4 to 17.9, while consumption of sulphur for the manufacture of sulphuric acid rose from 14.0 to 15.0. Phosphate rock consumption for fertilisers decreased from 68.3 to 65.5, while 3.34 (as against 3.18) went for industrial purposes. Another decrease was shown for basic slag consumption—from 52.4 to 45.7. Stocks of pyrites in December were 89, as compared with 97 in November, and those of sulphur for sulphuric acid manufacture declined from 66 to 61.8, while ammonia stocks, excluding ammonia produced in by-product factories and converted directly into ammonium sulphate, rose from 5.07 to 6.77.

German Technical Reports

Details from Latest List

APPENDED are details from the latest list of industrial reports by the British Intelligence Objectives Sub-committee (B.I.O.S.); the Combined Intelligence Objectives Sub-committee (C.I.O.S.); and the Field Information Agency Technical, U.S. Group, Control Commission (F.I.A.T.).

BIOS 223. *Visit to Austro-American Magnesite Co., Radenthein, Austria* (1s. 6d.).

CIOS XXVII—9. *Kupfer und Drahtwerke, Osnabrück*: Plant and Statistics: Iron, steel, copper, zinc, aluminium, and non-ferrous metal alloys (3s.).

CIOS XXVII—81. *J. Riedel-E. de Haen A.G., Seelze*: Miscellaneous chemical warfare items (1s.).

CIOS XXX—34. *Technical assistance on synthetic oils rendered the Japanese by I.G. Farben* (1s. 6d.).

CIOS XXX—63. *Styroflex*: A plastic produced by Norddeutsche Seekabelwerke (6d.).

CIOS XXX—83. *The arc process for acetylene production* (1s. 6d.).

CIOS XXXI—31. *H. Koppers G.m.b.H., Essen*: Coal and coke research (6d.).

CIOS XXXII—8. *Hexogen manufacture at the Bobingen factory of the G.m.b.H. zur Verwertung chemischer Erzeugnisse* (2s.).

CIOS XXXII—107. *I.G., Leuna*: Heavy chemicals based on hydrogen or hydrogen and carbon monoxide. Ammonia, synthetic petrol and synthetic alcohols, etc (20s.).

FIAT 16. *I.G. Farben, Wolfen*. P-C fibres (6d.).

FIAT 37. *Perlon-U; Polyurethanes at I.G. Boringen, Augsburg* (1s.).

The Canadian Government has reimposed control over thorium-containing minerals which are being studied as a possible source of atomic energy. Export permits for manufactured goods containing thorium and mesothorium salts have been cancelled. As far as is known, Canada has no thorium deposits, India being the main source of this element.

Personal Notes

Mr. E. A. O'Neal has been appointed a director of Monsanto Chemicals, Ltd.

Dr. L. A. Jordan, Director of the Paint Research Station, gained a seat on Surrey County Council in the recent elections.

Dr. J. R. Nicholls has become Deputy Government Chemist in succession to Dr. A. G. Francis, who recently retired.

Sir Edward Salt has been elected an honorary member of the Parliamentary and Scientific Committee.

Mr. Alexander C. Maclean, B.Sc., has been awarded the Ferguson Fellowship (for 1946-47) in Applied Chemistry, for research at Glasgow Royal Technical College.

Mr. C. Jepson has been appointed general manager of Manchester Corporation Rivers Department in place of Mr. J. M. Wishart, who has taken up a commercial appointment.

Dr. W. M. Ames, D.Sc., F.R.I.C., works manager and chemist, J. & G. Cox, Ltd., Edinburgh, and Dr. R. P. Cook, D.Sc., lecturer in biochemistry, University College, Dundee, have been elected Fellows of the Royal Society of Edinburgh.

Mr. Arthur Grundy, formerly chief purchasing manager to the Anchor Chemical Co., Ltd., has been appointed general manager of the subsidiary company which the company has decided to form in the U.S.A. as a result of the visit of Mr. T. Martin, managing director, last year.

Mr. G. A. Findlay, a director of the North British Rubber Co., Ltd., Edinburgh, was recently entertained to a complimentary dinner to mark his completing 50 years' service with the firm. Mr. Alexander Johnston, managing director, presented Mr. Findlay with a silver cigarette case, together with a cheque, subscribed by senior members of the staff.

Scientists well known in the chemical industry are prominent among the Independent Members of the latest group of Working Parties for Industry to be announced by Sir Stafford Cripps. Dr. R. E. Slade, F.R.I.C., M.I.Chem.E., until recently Research Controller of I.C.I., is serving on the Carpet Industry Party; Dr. L. T. M. Gray, A.R.I.C., is in the Linoleum Working Party; Professor H. Moore, A.R.C.S., F.Inst.P., of the Society of Glass Technology, is in the Domestic Glassware group; Professor W. T. Astbury, F.R.S., F.Inst.P., is in the Wool Working Party; while the Lace Working Party includes Professor J. M. Gulland, F.R.I.C.

Mr. B. H. Thorp, who has been appointed mechanical engineer to the Copper Development Association, was an apprentice at Smithfield Ironworks, Leeds, and spent a year in an engineering drawing office before going to Leeds University, where he took his B.Sc. (first class honours) and M.Sc. degrees in mechanical engineering. After four years' research on internal combustion engines at the University he was for three years assistant engineer to the British Burmah Petroleum Co. on the oilfields at Yenangyaung. He joined the scientific staff of the Admiralty, in 1937.

Obituary

The death occurred at his home, Shenstone Court, Berkhamsted, Hertfordshire, on March 5, of Sir Richard Ashmole Cooper, Bt., chairman of Cooper, MacDougall & Robertson, Ltd., chemical manufacturers. Aged 71, he was M.P. for Walsall from 1910 until 1922.

CHINA CLAY WORKING PARTY

The formation of working parties for ten more industries, including one for the china clay industry, was announced by Sir Stafford Cripps in the House of Commons this week.

The china clay working party will have as its chairman Professor W. R. Jones, who served in a similar capacity with the Working Committee on China Clay, whose recently published report was the subject of comment in The Chemical Age last week (*see* p. 252). Another member of the latter committee was Mr. J. H. Bennetts, who will also serve with the working party as a trade union representative, in company with Mr. J. H. Parsons and Mr. W. A. Stone. The employers' representatives have yet to be appointed, but Dr. J. Sykes will sit as an independent member. Two other independent members will be appointed later. Mr. T. K. Rees, of the Board of Trade, who was secretary of the Working Committee, will serve as secretary of the working party, jointly with Mr. W. C. C. Rose, of the Ministry of Fuel.

To ease the task of the welder and to speed his work has always been the special care of Murex, Waltham Cross, Herts. In two new products described in a new illustrated leaflet, have been embodied a number of advanced features, adding still further to the facility with which he can operate. These welding screens and helmets, being made of bakelite laminated fabric sheet are shock-resisting and comparatively non-hygroscopic—water absorption is only 2 per cent., as against 55 per cent. with fibre. These important characteristics enable them to withstand the most punishing treatment and suit them for use under all climatic conditions.

General News

From Week to Week

The U.K. January output of rayon was 15,000,000 lb., which is within 1 per cent. of the monthly average for 1939.

The Institute of Welding and the Society for Visiting Scientists have been elected to membership of the Parliamentary and Scientific Committee.

During the past three months the Birmingham County Council of the British Legion placed 756 ex-Service men and women in employment.

More than 300 British Council scholarships for study in Britain during the current academic year have been awarded to students from overseas. Thirteen of the students will take chemistry and pharmacology.

The telephone service with Portugal, reopened on Monday, is available on weekdays only between 8 and 9 a.m. and 3.15 and 4.15 p.m. The minimum charge is £1 1s. for three minutes.

The manufacture of hydrogen peroxide at Warrington is understood to be contemplated by a Luton firm. Boring operations for a supply of water, preferably slightly saline, have been taking place at Morley Common.

Liverpool Corporation has agreed to sell to Goodlass Wall and Lead Industries, Ltd., about an acre and a half of land and six buildings on the site of the Royal Ordnance factory at Kirkby for £8500 on a lease of 98½ years.

The Food Group of the Society of Chemical Industry will hold its summer meeting from May 30 to June 3—a week earlier than originally arranged. The alteration has been necessitated by the announcement that June 8 will be regarded as a victory holiday.

R. W. Greeff & Co., Ltd., announce that from March 18 their new head office, to which all correspondence should be addressed, will be at 12 Finsbury Circus, London, E.C.2 (telegrams, Greeff, Ave, London; telephone, LONdon Wall 5281—8 lines).

Owing to indisposition, Prof. F. G. Tryhorn will be unable to lecture on "Luminescence and Fluorescence" to Hull Chemical and Engineering Society on March 19; instead, Dr. W. B. Orr, of the University College of Hull, will lecture on "High Polymers."

Birmingham University has received for the development of its metallurgical department a gift, totalling nearly £137,000, from constituent associations and members of the British Non-Ferrous Metals Federation in response to a special appeal. The gift will enable the department to make a start on its plans without delay.

Because he expects to be in Germany, the lecture which Dr. V. G. Jolly was to have given on "Abnormal Colour Vision" to Manchester Section of the Oil and Colour Chemists' Association on March 22 has been postponed. A "brains trust" will be held instead, four speakers dealing with paint questions.

The importation into this country of not more than 200 German scientists and technicians has been decided upon by the Board of Trade, it is announced. The scientists concerned are volunteers and will work in an advisory capacity for a limited period; they will be lent by the Government to trade associations and research organisations.

Air services of the B.O.A.C. from Northolt to Copenhagen, to Oslo, and to Marseilles, Rome, and Athens started this week, half of the seats in each aeroplane being reserved for "non-priority" passengers. The Danish service will fly four times a week, the Norwegian thrice weekly, while the Athens plane will start every Thursday.

The Institution of Chemical Engineers is holding its 24th annual corporate meeting on April 12, at the Connaught Rooms, Great Queen Street, London, W.C.2. Official business, beginning at 11 a.m., will be followed at noon by the President's address on "Vapour Phase Absorption," and luncheon will start at 1 p.m.

Of 151 fatal accidents occurring among workpeople (other than seamen) during the course of their employment in the United Kingdom in January, three occurred in chemical, oil, soap, and allied factories. The total was an increase of 35 over the figure for December, 1945, but 18 fewer than in January, 1945.

In addition to resuming the award of the Ferguson Fellowship in Applied Chemistry (*see* "Personal Notes") the trustees of the Ferguson Bequest Fund have decided to revive the award of the Ferguson Scholarship and to increase its value to £150 per annum, tenable for two years. Competition is open to graduates of Scottish Universities, and an examination will be held next year.

Sir Stafford Cripps, principal guest at the anniversary luncheon of the Royal Institute of Chemistry on Tuesday, in replying to the chairman's toast of "His Majesty's Ministers," was extremely guarded in referring to the possibility that scientists might play a greater part in the national administration. Lord Samuel expressed regret that atomic energy should have been first used in the way it was, while Sir Robert Pickard suggested that greater recognition should be given to the work of physicists.

The conference on "Industrial Waste Heat Recovery," which the Institute of Fuel arranged to hold in the Geological Society's rooms, Burlington House, Piccadilly, London, on May 1, will be held there instead on April 30, to enable members to avail themselves of an invitation to attend the annual meeting of the Iron and Steel Institute at 4 Grosvenor Gardens, S.W.1, on May 1, when papers dealing with fuel problems will be presented.

The Minister of Supply has revoked the Control of Non-Ferrous Metals (No. 7) (Nickel) Order, 1941 (S.R. & O. 1941, No. 2091) which controlled the acquisition and disposal of nickel. Consumers can now obtain nickel without a licence, but for any supplies imported from abroad a Board of Trade import licence will have to be obtained. Copies of the now order, the Control of Non-Ferrous Metals (No. 21) (Nickel) (Revocation) Order, 1946 (S.R. & O. 1946, No. 301), are obtainable from H.M. Stationery Office.

The Town Clerk of St. Helens, Mr. W. H. Pollitt, addressing St. Helens Chamber of Trade last week, predicted an era of prosperity for the town such as had not been known since the days when the chemical industries were flourishing. In co-operation with other areas in South-West Lancashire, he said, St. Helens had been pressing for the inclusion in the Location of Industries Act, and an order would be made shortly putting that into effect. St. Helens would thus be enabled, with Government assistance, to clean up scarred areas and assist in the establishment of new industries.

Foreign News

The S.A. Tanins Belges is to go into liquidation.

The Société Française des Glycérines has recently started producing penicillin. The company also produces activated earths and bentonite.

A synthetic carnauba wax, stated to be equal to, and in many ways superior to, natural wax, is now being produced on a commercial scale in the U.S.A.

The world shortage of commercial fertilisers for 1946 food production is about 1,000,000 short tons, exclusive of large Far East requirements, according to a U.S. estimate.

The manufacture of gypsum on a large scale is being contemplated by the Salt Department of Ceylon. Delft Island, off the Jaffna coast, is being considered the most suitable spot for the purpose, since about 5000 tons can easily be produced per annum and transported to the new cement factory at Kankasanturai by motor boats. Common salt will be manufactured as a by-product and shipped to India.

Iron-ore output in the British zone of occupation in Austria rose from 10,390 tons in the second half of December, 1945, to 48,520 tons in January. Exports go mainly to Czechoslovakia in exchange for coal.

Under a trade agreement to be signed between Norway and France, Norway will supply nitrogenous fertilisers, zinc, aluminium, and pyrites, etc., in exchange for French chemical products, etc., and various North African and colonial products.

Chemical manufacturers in Palestine have begun to reorganise their plant with a view to increasing efficiency. In this connection, efforts are being made to eliminate the present high import taxes on raw materials and to facilitate the import of machinery.

The construction has been completed at Dakar, in French West Africa, of a plant to produce metal drums for the transport of ground-nut oil. The oil refineries of Senegal have just received American Henderson presses and are now equipped to treat 110,000 tons of nuts this year.

A large extension of the acreage under cinchona cultivation in India during the year 1944-45 was commented upon in a recent official report, which states that stocks of quinine sulphate and cinchona febrifuge have been increased by 101,419 lb. and 62,355 lb. respectively.

Rayon production in the U.S.A. during 1945 was 800,000,000 lb., which is more than double the 1939 output. The increase is regarded as a continuation of the uninterrupted growth of the industry since its foundation in the U.S.A. in 1911. Demand still exceeds supply.

Sales in Chile of industrial and medical chemicals during the third quarter of 1945 were about 25 per cent. higher than for the like period of 1944. Some items among substantial quantities of industrial chemicals received from Great Britain were the first to arrive since 1941.

The synthetic production of vitamin A, usually obtained from fish liver oil, is reported by Prof. Nicholas A. Milas, of Massachusetts Institute of Technology. The biological potency of the new product is claimed to be 50 to 100 times greater than that of cod liver oil.

In Finland the State-owned sulphuric acid and superphosphate company has recently been merged with the State Explosives Factory. This step is part of the transition of the country's economy from war to peace, since the manufacture of explosives is to be discontinued in favour of the manufacture of chemicals needed in Finland's reconstruction. In addition to sulphuric acid and fertilisers, especially superphosphate, the merged enterprises will take up the manufacture of DDT, plastics and other products.

Prices of British Chemical Products

FAIRLY active conditions in the London general chemical market during the past week are reported, both as regards the volume of new bookings and the rate of contract deliveries. Export inquiry, too, continues to be on a wide scale, although the volume of orders actually placed for overseas destinations has been limited by the supply position. There have been no outstanding features and the price position remains firm and steady. Chemicals for the textile industries have been in good demand, and other active items include tartaric acid, citric acid, hyposulphite of soda and the soda compounds generally. A tightness in spot supplies continues to be the main feature in the coal-tar products market, and a steady demand is reported for crude and crystal carbolic acid, pitch, cresylic acid, and the naphthalenes.

MANCHESTER.—Generally steady trading conditions have obtained on the Manchester market for light and heavy chemicals during the past week, with the textile and allied trades and other users specifying for good contract deliveries. Replacement buying on home trade account has been on a fair scale and there has been no lack of shipping inquiries in the market for caustic soda and other leading "heavies." A good aggregate quantity of fertiliser materials is going to the consumer end. Among the tar products, crude tar, pitch, creosote oil, and crude carbolic acid are meeting with a steady demand. Benzol and xylol are active, while in toluol and naphtha a moderate trade is reported.

Price Changes

Rises: Lead acetate; lead nitrate.
Falls: Potassium carbonate; sulphur.

General Chemicals

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

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

Alum.—Loose lump, £16 per ton, f.o.r.

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

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

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

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

Antimony Oxide.—£110 to £117 per ton.

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

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

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

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

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

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

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

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

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

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

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

Chrometan.—Crystals, 5½d. per lb.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Lead Acetate.—White, 56s. to 58s. per cwt. according to quantity.

Lead Nitrate.—About £49 per ton d/d in casks.

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

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

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

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

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

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

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

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

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

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

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

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

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

Paraffin Wax.—Nominal.

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

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

Potassium Bichromate.—Crystals and granular, 7¼d. per lb.; ground, 8¼d. per lb.; for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

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

Potassium Chlorate.—Imported powder and crystals, nominal

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

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

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

Potassium Prussiate.—Yellow, nominal.

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

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

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

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

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

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

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

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

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

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

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

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

Sodium Nitrite.—£20 15s. per ton.

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

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

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

Sodium Silicate.—£6 to £11 per ton.

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

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

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

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

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

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

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

Tin Oxide.—Nominal.

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

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

Rubber Chemicals

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

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

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

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

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

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

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

Chromium Oxide.—Green, 2s ped lb.

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

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

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

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

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

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

Plus 5% War Charge.

Nitrogen Fertilisers

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

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

Calcium Cyanamide.—Nominal; supplies very scanty.

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

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

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

Coal Tar Products

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

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

Creosote.—Home trade, 6½d. to 7d. per gal., f.o.r. maker's works. MANCHESTER, 6½d. to 9½d. per gal.

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

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

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

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

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

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

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

Wood Distillation Products

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

Methyl Acetone.—40/50%, £56 per ton.

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

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

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

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

p-**Nitraniline.**—2s. 5d. per lb.

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

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

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

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

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

Latest Oil Prices

LONDON.—March 13.—For the period ending March 30 (April 27 for refined oils), per ton, naked, ex mill, works or refinery, and subject to additional charges according to package: LINSEED OIL, crude, £65. RAPESEED OIL, crude, £91. COTTONSEED OIL, crude, £52 2s. 6d.; washed, £55 5s.; refined edible, £57; refined deodorised, £58. COCONUT OIL, crude, £49; refined deodorised, £49; refined hardened deodorised, £53. PALM KERNEL OIL, crude, £48 10s.; refined deodorised, £49; refined hardened deodorised, £53. PALM OIL, refined deodorised, £53; refined hardened deodorised, £58. GROUNDNUT OIL, crude, £56 10s.; refined deodorised, £58; refined hardened deodorised, £62. WHALE OIL, crude hardened, 42 deg., £51 10s.; refined hardened, 46/48 deg., £52 10s. ACID OILS: Groundnut, £40; soya, £38; coconut and palm-kernel, £43 10s. ROSIN, 30s. 6d. to 45s. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

East African Research

Second Annual Report Published

THE report of the East African Industrial Research Board for 1944, just issued, contains some interesting details about research work carried out on vegetable oils, notably cotton-seed oil. During the year experiments were continued on bleaching the oil, using a range of local and imported decolorising agents, including activated carbon, clays, and diatomite. Production of a high-quality oil was quickly attained, conforming to the American standard "Choice Summer Yellow." Research on the process for preparing motor fuel and other petroleum products from cotton-seed oil was not proceeded with, as the "waste product" which it was proposed to use came into full demand as a source of edible oil. A patent specification for the process was lodged, however, the main new feature introduced being the direct distillation of the seeds themselves, so that preliminary extraction of the oil was rendered unnecessary. The seed, raised to a temperature of 500-550°C., at which the oils were vaporised and partly cracked. The vapours then passed to a cracking tube at about 100 lb./sq. in. pressure and a temperature between 500° and 650°C., where cracking continued. From the gases issuing thence, fuel oils were condensed, and then refined by conventional methods.

Totaquina Production

Further research was undertaken in the departments dealing with vegetable insecticides and phosphate rock, and much work was done in the new Ceramics Laboratory. At the same time the Tanganyika Totaquina Factory made considerable progress under Dr. K. B. W. Jones, A.R.C.S., A.R.I.C. During the year, 7656 lb. of lump totaquina were produced, bark consumption increasing from 20-22 lb. per week to 26-28 lb. per week. Plans for 1945 contemplated processing up to 38 lb. per week, as the East African demand for totaquina was nearly 50 per cent. greater than total production in 1944. It would have been possible to review the publication in somewhat greater detail if the copy received had not been lacking four important pages in the middle. Copies (1 rupee 50 c.) can be obtained from (and inquiries may be addressed to) the Secretary, E.A. Industrial Research Board, P.O. Box 1587, Nairobi.

Forthcoming Events

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

March 18. Association of Austrian Engineers, etc. 69 Greencroft Gardens, N.W.6. 7.15 p.m. Dr. M. F. Perutz: "Crystallised Proteins."

March 19. Hull Chemical and Engineering Society. Regal Room, Ferensway, Hull. 7.30 p.m. Dr. W. B. Orr: "High Polymers."

March 19. British Association of Chemists (Leicester Branch). Leicester Technical College, 7 p.m. Mr. H. Pirie: "Gammexane—the new British Insecticide."

March 19. Royal Institution of Great Britain. 21 Albemarle Street, W.1, 5.15 p.m. Sir Lawrence Bragg: "The Atomic Struggle of Minerals—I."

March 19. Tar Industry Meetings. Queen's Hotel, Leeds, 1. National Creosote Executive Committee, 10 a.m.: A.T.D. Executive Committee, 2.15 p.m.

March 19. Society of Chemical Industry (Agriculture Group). Royal College of Science, Exhibition Road, South Kensington. 2.30 p.m. Dr. H. Martin: "Insecticides—Chemical Composition and Toxicity."

March 20. Institute of Fuel. Leeds University, 2.30 p.m. Mr. Oliver Lyle: "Inefficiency."

March 20. Society of Chemical Industry (Plastics Group). Gas Industry House, 1 Grosvenor Place, S.W.1, 6.30 p.m. Dr. J. Hofton: "Aminoplastic Adhesives."

March 20. Tar Industry Meetings. Queen's Hotel, Leeds, 1. A.T.D. annual general meeting, followed by ordinary general meeting, 10.30 a.m.; B.R.T.A. Finance Committee, 2 p.m.; B.R.T.A. Managing Council. 2.30 p.m.

March 20. Society of Chemical Industry (Food Group and Microbiological and Nutrition Panels). Rooms of the Chemical Society, Burlington House, Piccadilly, W.1, 6.30 p.m. Dr. E. C. Barton-Wright: "Amino Acids and the Metabolism of the Cell."

March 21. Tar Industry Meetings. Queen's Hotel, Leeds, 1. Pitch Supply Association, 9.30 a.m.; Pitch Marketing Co., Ltd., 9.30 a.m.

March 21. British Association of Chemists (Notts and Derby Section). School of Art, Green Lane, Derby, 7 p.m. Prof. R. G. W. Norrish: "Gaseous Explosions."

March 21. Royal Institute of Chemistry (Belfast and District Section). Royal Academical Institution, 7.30 p.m. Annual general meeting.

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

March 22. Society of Chemical Industry (Plastics Group). University College, Cardiff, 7 p.m. Mr. N. J. L. Megson: "Production and Application of Plastics in War-time."

March 22. Royal Institute of Chemistry (Cardiff and District Section). **Society of Chemical Industry** (South Wales Section). University College, Cardiff, 7 p.m. Mr. N. J. L. Megson: "Plastics."

March 22. Royal Institute of Chemistry (Edinburgh and East of Scotland Section). **The Chemical Society, Society of Chemical Industry.** North British Station Hotel, Edinburgh, 7.30 p.m. Dr. W. G. Ogg: "Trace Elements in Agriculture."

March 22. Oil and Colour Chemists' Association (Manchester Section). Engineers' Club, Manchester, 6.30 p.m. Brains trust—Mr. E. J. Bond: "Paint Formulation"; Mr. F. G. Dunkley: "Paint Application and Testing"; Dr. H. A. Hampton: "Synthetic Resins"; Mr. V. Watson: "Pigments." Question master, Dr. M. E. D. Jarrett.

March 25. Association of Austrian Engineers, etc. Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 7 p.m. Prof. G. Schlesinger: "Japan's Industries."

Company News

Universal Asbestos Manufacturing Co., Ltd., announces a profit of £112,904 (£120,295) for the year to September 30 last. The ordinary dividend is unchanged at 20 per cent.

General Refractories report trading profit for 1945 totalling £176,795 (£186,125). The dividend remains at 7½ per cent., and there will be a Victory bonus of 1½ per cent., making a total of 9 per cent. for 1945 (7½ per cent.).

New Companies Registered

Fisons Pension Trust, Ltd. (405,684).—Limited by guarantee, without share capital. Trustees of the Fison Group Pension Fund. Directors: F. G. C. Fison, Ipswich, chairman of Fisons, Ltd.; P. T. Chevallier, director of Fisons, Ltd.; two other directors and two clerks to Fisons, Ltd.; and C. Farrow. Registered office: Harvest House, Ipswich.

Chemical and Allied Stocks and Shares

WITH international uncertainties exerting a stronger influence, stock markets became hesitant, although the volume of business in most sections was again well maintained. British Funds were less buoyant and home rails steady on further consideration of statements at the annual meetings; while dividend increases and victory bonuses resulted in numerous good industrial features. Confidence is growing in the market that a more liberal dividend policy is likely to be followed in numerous instances, particularly as it is now unnecessary to continue to build up reserves which were established specifically for war-time contingencies. In other directions, some shares were favoured on hopes of future benefits arising from Dominion income-tax relief; sentiment was also assisted by the prevailing belief that the Budget will bring a measure of taxation relief.

Chemical and kindred shares have been firm generally in accordance with the tendency in industrials, Imperial Chemical being 40s. 7½d., British Aluminium 39s. 1½d., Distillers 117s. 6d., and British Oxygen 88s. 6d. Courtaulds showed activity around 54s. 9d. prior to the dividend announcement. Turner and Newall, however, receded to 82s. 6d., and United Molasses to 48s. 6d., but Dunlop Rubber at 55s. 9d. were higher on market hopes of an increased dividend. Shares of companies interested in plastics attracted rather more attention. De La Rue moving up to £10½, British Industrial Plastics 2s. ordinary were 6s. 10½d. on further consideration of the results, and Erinoid 5s. shares 13s. A good feature was a sharp rally to 46s. 3d. in Borax Consolidated deferred, awaiting the full results and annual meeting. General Refractories at 21s. 3d. were firm on the victory bonus of 1½ per cent., which raises the year's distribution from 7½ per cent. to 9 per cent., while Blythe Colour 4s. shares at 35s. 7½d.xd., scored a substantial rise on the bigger dividend and victory bonus.

There was a firmer undertone in the iron and steel section with Guest Keen good at 42s. 6d. on the bigger payment announced by Guest Keen Baldwins. T. W. Ward at 44s. and Ruston & Hornsby at 60s. 3d. strengthened, but Allied Ironfounders at 58s. 6d. lost part of an earlier rise, while Cannon Iron firmed up to 22s. 6d. Babcock and Wilcox kept at 60s. Colliery shares became easier with Staveley 42s. 3d. and Powell Duffryn 20s. 9d.

Electrical equipment issues attracted on export trade scope, Associated Electric being 61s., Siemens 41s., General Electric 94s. 3d., and Crompton Parkinson 31s., while Lancashire Dynamo moved up to £5¾, and Brush Electrical 5s. ordinary at 11s. were also higher.

W. J. Bush were around 85s., and remained firmly held on higher dividend prospects and the company's excellent results over a long period. Dividend for some years has been limited to 10 per cent., but earnings have been well in excess of this and last year exceeded 50s. per cent. B. Laporte

held their recent rise to 84s. 4½d. Fisons were 55s. 9d., Monsanto Chemicals 5½ per cent. preference 23s., Greeff-Chemicals 5s. ordinary 9s. 3d., and Burt Boulton 25s. News of the acquisition of a Government factory and talk of a coming share offer drew fresh attention to British Drug Houses shares, which further advanced to 62s. Beecham's deferred were active around 23s. 3d. on higher dividend prospects. Sangers 30s. 6d. and Aspro shares active around 33s. Boots Drug at 59s. 9d. were good, partly in sympathy with the increased dividends and general rise in shares of companies with stores and kindred interests. Oils shares rallied, but later declined on international politics. Anglo-Iranian, after recovering to 100s., lost 2s. 6d. at 97s. 6d.

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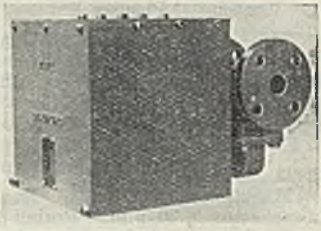

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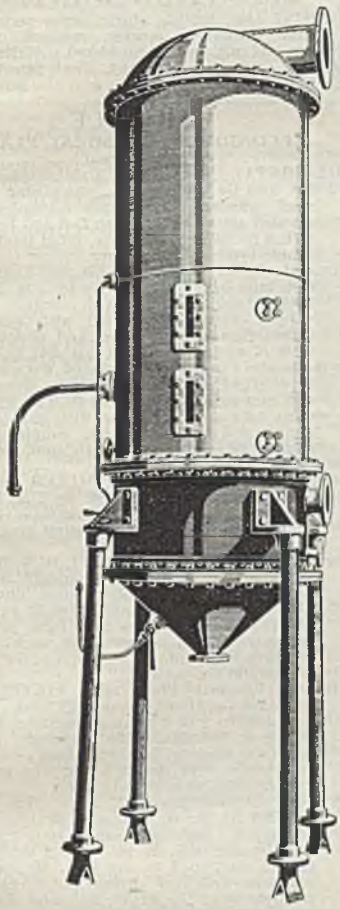

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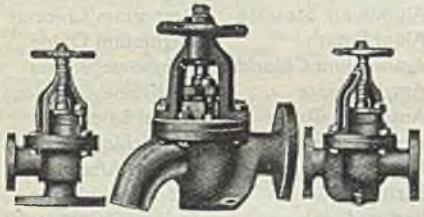
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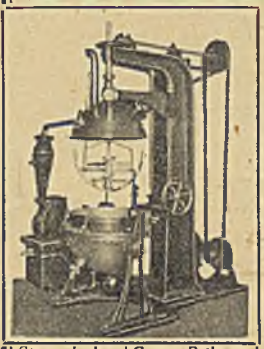

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