The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Reflections on the Ayre Report

THE report of the Hydrocarbon Oil Duties Committee was published in our issue of April 21. It will have been seen that the Committee fully recognised the importance of the carbonising industries and the urgency of developing the synthetic organic chemical industry in this country. As a result of these considerations and of the evidence put before it, the Committee has accepted the view that the present hydrocarbon oil duties are a hindrance to the development of the organic chemical industry. The necessary consequence of this conclusion is that the organic chemical industry should not be asked to pay the tax on imported oil, nor on home-produced oil used for the purpose of chemical synthesis. This includes both aliphatic and aromatic oils derived from petroleum or coal.

It is also concluded that the effect on the carbonising industries of the existing duties of 9d. a gallon on light oil and 1d. a gallon on heavy oil is such that these industries should not be deprived of the advantage that has been given them through this tariff protection. Carbonisation is demonstrably the most effective method of using coal, and anything that can assist in developing this industry still further should be done. This is evidently the Committee's view and it is sound.

The Committee has thus arrived at two apparently opposite conclusions and has resolved its difficulty by suggesting that the present level of taxation on imported oils should stand, but that the chemical industry, for specific purposes of chemical synthesis, should be allowed imported oil tax-free and should receive a payment of 9d. a gallon in respect of home-produced light hydrocarbon oils and of 1d. per gallon on heavy oils used as raw materials in the course of chemical synthesis.

There is no specific support for the view which has been pressed in these columns for the establishment of home refining of petroleum oils. The Committee has agreed that if refining of petroleum were carried on in this country, the raw materials required by the synthetic chemical industry would be made readily available. The Committee, however, regards this question as outside its terms of reference and it does not suggest that the incidental provision of raw materials for the chemical industry is of decisive importance in that connection. We are

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doubtful of the validity of this conclusion. The home refining of petroleum would be very much more attractive if the refiner was assured of an outlet for his by-products as he appears to be in some instances in America. From the refinery the chemical industry would take products for which there is virtually no other economic use. We have given reasons on other occasions why a synthetic organic chemical industry based on petroleum refineries would be of immense value to the country. This conclusion strikes us as being weak and as having been reached without complete consideration of the problem.

The Committee is on firmer ground when it emphasises the great importance of coal carbonisation and of the necessity for not reducing any of its existing sources of revenue. The total financial benefit accruing to the carbonising industry from this taxation was over £2,000,000 a year before the war, an amount which cannot be lightly discarded without considerable detriment to the economics of the process.

Is the effect of the hydrocarbon duties on the chemical industry as great as the Committee declares it to be? That is a question on which we should frankly like more information. It is admitted in the report that:

"the consequent effect on the cost of chemicals derived from benzol depends on the yield and on the number of steps in the chemical synthesis which separate the original raw material from the final product, and may be more or less than 1d. per lb. on the primary intermediates, although at that stage the average is still about 1d. per lb. The effect is less on products further removed from benzol—thus, on a finished dyestuff it may amount to as little as 0.2d. per lb., although it is commonly considerably more than this—while, at the same time, the importance of this price increase is still further reduced owing to the enhanced value of the product."

The annual cost to the chemical industry is stated to be of the order of £375,000. Is it correct that such a comparatively small figure, spread over the production of dyestuffs, of plastics, and of other forms of chemical industry, will make so large a difference to the cost of production in these industries as the Committee appears to believe? We repeat that further information is desirable on the evidence which has led to this conclusion. The amount of money involved seems to us to be very small for the effect that it is to produce.

While the carbonisation industries and the chemical industries will be quite satisfied with what is given them in the report, the tar distillation industry may not be quite so enthusiastic. The attention of the Committee has been drawn to the fact that a reduction in the price of benzol to the chemical manufacturer would result in a fall in the cost of synthetic products; these would include the non-hydrocarbon compounds also derived directly from tar, and the tar distiller would thus suffer a loss of revenue. An outstanding example is phenol, where the price reduction, corresponding to the proposed allowance of 9d. a gallon on benzol, would amount to about 1d. per lb. The Committee is alive to the importance of fostering the tar distillation industry, which provides the chemical industry with so many valuable products, but after careful consideration has come to the conclusion that the price reductions in synthetic materials, consequent upon the implementation of the Committee's proposal, should not inflict serious injury on the tar distillation industry.

The report may have several effects if it is accepted by the Government. One of these may be the greater interest in the production of intermediates by the tar distiller and by the carbonising industries. They would receive the same tax rebate on materials used for this purpose as is given to those who are now their customers. If the proposed subsidy is really sufficient to stimulate production it may well be that the demand for tar products will increase so greatly as to offset any disadvantage to which the tar distiller may be put by these proposals. It has been pointed out that the scale of production of coal-tar products for plastics and the chemical industry is a good deal less than that in the U.S.A. and for that reason our costs of production are higher. It is very necessary that the chemical industry should not be content to wait for decreasing prices of its raw materials, but do all that is possible by independent, technical methods to reduce costs of production. The experience of many industries suggests to us that there are possibilities of price reduction inherent in most processes as conducted in this

country which far outweigh the 1d. per lb. proposed by this report.

There are possibilities to which this report does not call attention. The recovery of ethylene from coal gas on a large scale is likely to put huge quantities of olefines at the disposal of the organic chemical industry if it so desires. Would liquefied olefine be classed an oil and qualify for the 9d. a gallon allowance? In our view that would be a very useful extension. The Gas Research Board has under examination processes which may well lead to a vast increase in the amount of aliphatic chemical raw material available from coal. Will liquid methane receive the same consideration if used for chemical synthesis? Liquefied hydrocarbon gases are certainly "light hydrocarbon oils." We should surmise that if the proposed allowance stimulates production to the extent that the Committee evidently believes, it will ultimately amount to considerably more than £400,000 a year.

Finally, what is the length of the period over which the scheme will operate? The hydrocarbon oil duties fall to be reviewed in 1950. Unless there is some earlier assurance that the present duties and the proposed tax-remission are to be continued after that date, manufacturers will not be anxious to embark on new developments if these are rendered possible only by such adventitious aid. The effect of the oil duties on hydrogenation is an example that might be studied with profit.

NOTES AND COMMENTS

The Future of Base Metals

SPEAKING on the future of base metals at the annual meeting of the Institution of Mining and Metallurgy last week, the president, Lt.-Col. Edgar Pam, restricted himself largely to a discussion of the probable price position in the years to come. He was not particularly cheerful about the future, and though all will agree with him that a considerable increase in price, as compared with pre-war figures, is to be expected, we feel that he perhaps paid too little attention to the technological advances made during the war, and made too little allowance for a continuation of these beneficent activities. Supplies, he surmised, would be ample for some years, in view of the falling-off in demand which was bound to result from a gradual diminution of warlike requirements, but ultimately a shortage of such standard base metals as copper, zinc, lead, and nickel must be expected. No important new ore bodies have been located, despite intensified efforts, and it seems likely that metal will have to be produced from poorer ore in existing mines. There was, of course, the usual appeal to the Government to intensify the extension of geological surveys, and to increase their support to universities, technical schools, etc.; we should have liked to hear a more stirring appeal to users of base metals to intensify *their* efforts (already fairly considerable) at research into technological improvements. Any glance into the American metallurgical press will reveal that interested concerns in the U.S. are not letting the grass grow under their feet while their Government perpends.

A Research Survey

A DEPUTATION of the Parliamentary and Scientific Committee, introduced by Lord Samuel, has been received by the Chancellor of the Exchequer, who has promised to give careful consideration to their proposals. The deputation included three M.P.'s—Sir George Schuster, Mr. E. W. Salt, and Sir Peter Bennett—and Mr. J. G. Bennett, late director of B.C.U.R.A. What they are asking for is a survey and stocktaking of our past achievements and shortcomings in research, together with an outline of our present resources in that field and our needs for the future. It is pointed out that our country ought to play a leading part in the pursuit of scientific knowledge and in its application, particularly to industry and agriculture, and it is noted that the work of our scientists during the war has shown that there is nothing wrong with their quality. Some doubts are expressed, however, as to the quantity of the resources available to them; and it is believed that the publication of a

survey, on the lines indicated above, would arouse great public interest, and would win support for a vigorous official campaign of research, besides creating a progressive frame of mind among industrialists. The Chancellor, while promising to take thought on the matter in consultation with his collegues, asked for further particulars about the terms of reference for such an enquiry. It will be especially interesting if we are to be told just what sums of money have been spent by the Government on research, as well as how such monies have been allotted.

Drugs for Belgium

THE liberated countries of western Europe, so long cut off from sources of supply outside the continental zone, are still experiencing great difficulty in obtaining chemical supplies. The Pharmacie Centrale de Belgique, a company occupying a leading position in its field, reported only a fortnight ago that it had placed substantial orders both in this country and in the United States, but that while small quantities had been received from Great Britain, no material had as yet arrived from America. Unfortunately, there is a large discrepancy between British and U.S. export prices. The Pharmacie Centrale states that the prices in this country were 40 per cent. higher than those in the U.S. The cost of production in Belgium has not, of course, remained unchanged during the war. Officially, prices were raised by one-third, and it is intended to obtain authority to raise the inland prices to 60 per cent. above the level obtaining on May 10, 1940, the date of the German invasion of Belgium. The prices of imported products in the Belgian market are based on those at which they are obtained abroad, and since supplies are so difficult to obtain, Belgian importers are presumably willing to pay almost any price if they can secure early delivery. Yet the discrepancy between British and U.S. prices and the independent course of Belgian home prices indicates certain dangers which call for vigilance, the more so as the continental countries, shorn of their stocks, will need large supplies and will try to obtain these from the cheapest source. The extent of the orders to come may be gauged from the fact that the Pharmacie Centrale de Belgique has liquid funds amounting to 15,000,000 francs, yet expects to require additional capital to meet its re-stocking needs.

Scottish Diatomite

LOOKING at the Bartholomew "half-inch" map of the Isle of Skye, the interested observer may note, in the northern peninsula called Trotternish, the "conventional sign" indicating a light railway some two miles long, and a mention, in two places, of "diatomite works." In our own copy of the map, one of these has been rudely scored out, and as things are at present, the correction is right. In Bulletin No. 5, however, of the Scottish Reconstruction Committee (*see Quarry Managers' J.*, April, 1945), Mr. Robert H. S. Robertson would have it otherwise, and appeals for a revival of the diatomite industry in Skye and on the Moor of Dinnet, Aberdeenshire. He points out that the old objection—that it does not pay to work small deposits of minerals—is likely to die a natural death; and in any case the Skye deposits could yield 1000 tons a year for 70 years, and the Aberdeen deposits twice that amount for 84 years. Mr. Robertson usefully suggests that the working of these resources should be brought into a scheme of general regional development, possibly under the guidance of technical institutes; and it is noteworthy that provision for such an institute on the mainland near by was recorded in our pages a few weeks ago.

A Chance for Research

SINCE sugar-refining is one of the main industries of the West of Scotland, in which the most expensive diatomite is used for filtration, it might be useful, it is suggested, to set up in the Greenock district the expensive rotary furnaces required for processing the Scottish diatomite, so that the expensive grades used in the sugar works could be regenerated in the same plant. Collaboration with the research workers of the producing firm would also be convenient. Diatomite has manifold uses, and, at the very least, a wide research programme would appear to open before the Scottish Raw Materials Research Laboratory already proposed.

FUEL ECONOMY IN THE CHEMICAL INDUSTRY

Fuel Economy Discussions

IV.—Mechanical Stokers for Low-Grade Fuels

by B. M. THORNTON, M.Sc., M.I.Mech.E.

BEFORE dealing with the subject of mechanical stokers, it is as well to dispel the impression which seems to prevail throughout the country that *all* fuel mined to-day is low-grade—if it is not low-grade at the factory, it is low-grade at home. The average quality of the coal mined to-day, to judge by the ash content only, has certainly deteriorated, but not so much as is commonly supposed. Taking two of the largest I.C.I. boiler plants as an example, the average ash content of the coal used was, in 1939, 8 to 9 per cent.; at the close of 1944 it was running from 11 to 12 per cent. Such a small rise in ash represents no difficulties, or new problems, in boiler plants fired with mechanical forced-draught stokers. What is troublesome is the occasional very great variation in quality. For example, a material described on the wagon label as "nuts" contained no less than 49.6 per cent. of ash. Other less extreme variations are not uncommon, and it is these variations which cause most worry. Also, before the war these factories were supplied with about 100 different-named coals whose qualities they *knew*, but at one time during the war they had well over 200 different supplies. But it is not the purpose of the discussion to inquire into the whys and wherefores of these happenings, and these experiences are probably those of many users.

Grouping of Coal

My own firm, long before the war, took advantage of the then prevailing price differential between "good" and "bad" coals and adopted equipment to burn "bad" fuels wherever possible. In order to do this, and to safeguard factory output, we adopted a coal-grouping system so that when a wagon enters the works (there are nearly 200 a day) it is labelled with its group and sent to the plant most suited to burn it. For example, fine, dry, high-ash coals (45 per cent. through $\frac{1}{8}$-in. mesh and ash over 20 per cent.), which are quite unsuitable for mechanical stokers, are sent to a pulverised-coal-burning plant. Another group is washed fine fuels; these are "sandwiched" between wagons of dry slacks, and during tipping and conveying a mixture is secured which can be burnt even on natural-draught chain-grate stokers. Coke breeze, when we can get it, is burnt on the sandwich system, in which a layer of breeze is run from a divided hopper on to the grate beneath a layer of coal. Up to 30 per cent. or more of breeze can be burnt satisfactorily in this way. We also mix breeze with slack. Abrasion of fans and ducting is much more rapid with breeze mixtures than with coals, and all our plants are (or were) equipped with large rubber-lined coal chutes.

Smalls and Outcrop Coal

At the end of 1941 we had to burn many thousands of tons of South Wales blended smalls. These fuels contain about 20 per cent. of volatile matter and were burnt successfully by the following means: (1) Using a fairly thick fuel bed, with more forced-draught compartments open than are used with a volatile bituminous coal; (2) paying particular attention to the wetting of the fuel to reduce fuel-bed resistance and avoiding "patchy" fires; both these operations reduce the "grits" in the flue gases (these fuels contained about 50 per cent. through $\frac{1}{8}$ in.); (3) by increasing primary, and decreasing secondary air supplies. These South Wales fuels will not burn successfully if mixed with bituminous coals owing to the difference in burning rates. No trouble was experienced with ignition. At maximum rating, the grit carry-over was the major nuisance. We were not sorry to see the last of this fuel, although, at all times, we were able to maintain the load.

Over the past few months, supplies have included up to 2000 tons a week of screened outcrop coal. The coal is not, as a rule, high in ash (about 12 per cent.), but contains about 20 per cent. moisture, most of which is inherent. The fuel is highly oxidised, is of low rank, and is free-burning. However, one of the stations has been run for some months on nothing but outcrop. For burning on mechanical stokers, it is absolutely essential that the fuel is screened through a 2-in. grid (the large lumps obtained from the workings are of no use except for stealing and taking home). When burning this fuel on mechanical grates with almost archless settings, a thick fuel bed is used with slow grate speed in order to maintain ignition.

Anthracite and Anthracite Duff

We are not normally supplied with these fuels, but have carried out experiments for various Ministries. Anthracite can be burnt on mechanical-stoker-fired furnaces, but only successfully with specially-designed

furnaces and grates. It appears that the Americans have made most progress in this direction, and 20 years ago I was amazed to see Eastern Pennsylvania anthracite being burnt under large boilers in New York City, a few yards from Wall Street. From experiments, it appears that anthracite duff carefully mixed with a coking bituminous coal can be burnt on most mechanical stokers when the mixture contains about 20 per cent. of duff, and not more than 30 per cent. But we have not had much experience, and it would be premature to say that the "combustion" would always be satisfactory.

Washery Slurries and Aspirated Fines

These fuels can be burnt successfully on hand-fired forced draught furnaces with, as a rule, stationary grates. There is one mechanical moving-bar stoker, the Wilton, which I have seen successfully burning wetted fines. The Hodgkinson Stoker Manufacturers have built two or three experimental stokers with the object of burning slurry, and their chief engineer, Mr. Guy, has described these.[1] The B.C.U.R.A., in co-operation with the manufacturers of the Crosthwaite stoker, have designed a mechanical stoker for burning slurries, and their chief engineer, Dr. E. G. Ritchie, has reported promising preliminary results.

But the coal industry's own panel on the utilisation of low-grade fuels under the chairmanship of Mr. R. G. Evans, has said this: "So far as is known, there is no design of mechanical stoker now in operation in this country for either Lancashire or water-tube boilers which will satisfactorily handle these low-grade fuels in their raw state."[2]

The problem of firing these fuels mechanically will eventually be solved. In any case, this is essentially a problem for the collieries rather than for the average industrial user; the collieries to-day burn 50 per cent. of the slurries produced in their washeries.

Sprinkler Stokers

So far, I have attempted to describe how a large works has dealt with the existing fuel situation with existing equipment. Some of the smaller mechanical stokers used for firing shell boilers and small furnaces will next be described, with a brief review of our experiences. One design of sprinkler stoker is of the jerking shovel type with moving bars. The other type, and that most favoured in America, has a high-speed rotary distributor, with both stationary and moving grates.

Sprinkler stokers, in general, have the following characteristics: (1) They will burn high ash fuels successfully when equipped with forced draught; (2) they will burn free-burning and coking coals equally well; (3) while they are not generally so free from smoke as the coking type of stoker, they are commonly believed to respond to load demands more readily than the coking stoker. (This may not be true of coking stokers equipped with forced draught). Sprinkler stokers of all types perform admirably with good graded coals, it is when burning high-ash slacks that the loss of efficiency through unburnt carbon in the "grit" becomes serious, and may amount to 5 per cent. or more; this loss increases with the boiler load, and in certain situations grit can be a real nuisance.

Coking Stokers

Coking stokers, when equipped with forced draught, can burn fuels of high ash content. The CO_2 normally obtained with them is perhaps not quite so good as with the sprinkler stoker. They give considerably less trouble from grits than the sprinkler, and, owing to the method of introducing the coal, they give more freedom from smoke. The coking stoker is not as versatile as the sprinkler in the range of fuels which it will burn successfully, and with natural draught it does not respond so readily to load demands. On the other hand, it is a quiet, slow-running machine with little wear and maintenance of the moving parts.

We have also a fairly large number of small stokers of the underfeed screw or ram type for firing furnaces. These stokers were never designed to burn low-grade coals, and they will not work satisfactorily without very considerable attention to the fire. These stokers work tolerably well when burning small graded coal with a low ash content of high melting-point, and the key to good combustion with this class of stoker is to keep the reacting surface of the fuel as large as possible, *i.e.*, "coke trees" must be broken up as they form.

To a very limited extent, chain-grate stokers have been used to fire shell boilers. One type is already on the market, the Morton-Illinois; and Messrs. Babcock and Wilcox have recently designed a very neat forced-draught chain-grate stoker for this purpose. I have seen both these designs in work, and, as with other chain grates equipped with forced draught, they should prove very versatile in the range of fuels which they will burn.

A Special Design

Mr. Thornton concluded with a description of a stoker of his own design, drawing attention to the following features:

(1) The fuel hopper has vertical sides

[1] *See* discussion of paper by Dunningham and Thornton on "Mechanical Stokers for Shell Type Boilers" at Carlisle. (*J. Inst. Fuel*, December, 1944).

[2] The Coal Industry Joint Fuel Efficiency Committee's Technical Panel 1; "On the Utilisation of Low-Grade Coals."

with the exception of the front plate which can be raised for hand-firing, in emergency, and slicing. This shape of hopper minimises trouble from holding up when firing fine wet coals.

(2) The fuel bridge is exactly similar to that used on a travelling grate stoker, ensuring an absolutely even fuel bed of any desired height. The fuel-bed contour can also be varied to counteract effects of segregation, as the bridge is in sections the heights of which can be adjusted individually.

(3) Controllable secondary air is introduced in slots behind the bridge, where it is also preheated.

(4) All the firebars are of the same shape. The part engaging the cams is bolted to the firebar proper. The firebars can be replaced from the stoker front. The stroke of the firebars is adjustable from zero to 3 in. by simply turning a handwheel.

(5) There are two shapes of cam driving the firebars, both of which can be removed and replaced in a few minutes.

(6) The forced-draught compartment has a damper control beneath the grate.

(7) The coking plate is easily removed and can be made of different shapes and lengths to suit particular fuels.

(8) The stoker has no separate motors, no high-speed shafts, no clutches, no ratchets, no springs, and no gears whatever.

DISCUSSION

Q.—The arrangements described for distribution of coal throughout the works are very impressive, but could only be applied to a sufficiently large concern. Two other similar arrangements may be quoted: The Gas Light & Coke Co. are understood to screen (when necessary) at Beckton and to distribute nuts to the verticals up the river and to use the slack in the coke ovens and horizontals at Beckton. The Portland Cement Association arranges to receive a bulk allocation of various types of coal and to distribute them to works equipped for using each particular type. Could not other industries have done this, for example, the chemical industry on a regional basis?

A.—No reply was given.

Q.—What is "low-grade fuel"? What constitutes a "low grade"?

A.—Ash content and size each have a bearing on the point, but a definition is impossible, since it must depend on the equipment available. Dust containing 30 per cent. of ash can be burnt by pulverised-fuel equipment, but on a chain-grate stoker most of the dust would go unburnt up the chimney. The nature of the ash is also important.

Q.—How does wetting assist in burning fine coal? It has been stated elsewhere that the important factor is not the resistance of the fuel bed as a whole, but rather the caking properties of the coal and the occurrence of blowholes which influence the pressure drop through the fuel bed. Thus channelling and caking far outweigh particle size as factors in fuel-bed resistance.

A.—Measurement of the resistance of a wetted slack and a dry slack will show a lower resistance for the wetted slack; but that does not invalidate the suggestion just made as to channelling and caking. Two fundamentals are necessary for chain-grate stokers: an even fuel bed and uniformity of ignition, which last is secured by wetting.

The Effects of Wetting

Q.—Does not the effect of wetting depend on the character of the coal?

A.—Many believe that the benefit is only secured when using a coking coal; but that is not true. One speaker believed that when fuel is wetted the volatiles are driven off very much more slowly so that a different form of coke is produced. If a smaller coke can be produced a more even fire results, with more even distribution of the air and improved ignition. Anthracite duff is better burnt in a wetted condition than dry. Another speaker mentioned that when dealing with very highly caking coals in the laboratory, some coals in the volatile-matter test will bubble over the top of the crucible; the two ways of dealing with that are to mix inert material with the coal and to reduce the rate of heating; I believe that wetting reduces the rate of heating.

Another speaker pointed out that, in carbonising, a moisture content of up to about 7 or 8 per cent. has no influence on the rate of coking, but above this it reduces the rate of coking considerably. In a stoker there is also a secondary effect, namely that the air passing up through the fuel will oxidise the coking constituents and reduce the coking power of the coal. Water, by delaying the reactions in the fuel bed, will give more time for the oxidation to take place.

Q.—Does not the physical effect of wetting also have an important influence on fuel-bed resistance?

A.—S. F. Benson has observed that the rate at which air passed through the bed did not vary progressively with the thickness of the unfired coal; undoubtedly, wetted coal gives less resistance than dry coal. Very fine dust, when moistened, tends to form balls and this may be the reason. By tapping the coal for a few minutes it settles and the resistance is greatly increased.

Mr. Thornton summarised this discussion by pointing out that, except for some open-cast coals, wetting is agreed to be highly beneficial to the combustion of slack. Spraying water in the hopper is ineffective but

the use of exhaust steam in the hopper after the coal has been wetted is found to give good results.

Q.—What is the general opinion of the value of open-cast coal?

A.—A discussion on this subject revealed that no one had anything seriously derogatory to say about the present supplies of open-cast coal provided that they were screened. This coal is helping in a substantial way to bridge gaps in our fuel supplies.

Q.—How can breeze and coal be mixed satisfactorily on a small works?

A.—Reasonably satisfactory results have been obtained by grabbing with an overhead telpher or a Scotch crane from individual dumps and allowing the fuels to mix as they travel through the coal-conveying system and bunkers.

Q.—A speaker gave his experience of burning the breeze from metallurgical coke in a steelworks. This material was thrown away and was ½ in. to 0 in. in size. It clinkered badly in a retort stoker, particularly heavy clinker forming in the troughs, so that it emerged looking like concrete columns at the back of the combustion chamber where it stayed; the fuel built up upon it, and the plant came to a standstill. The solution found was to mix the breeze with its own weight of fairly high-volatile coal; this improved combustion efficiency and completely changed the character of the clinker.

A.—It is clear that from 30 to 100 per cent. breeze can be burnt on mechanical stokers, the amount depending on the type of stoker, and whether burnt mixed with bituminous coal or on the sandwich system. There are mechanical difficulties associated with the use of breeze, particularly those of abrasion of fuel chutes, etc. Methods of preventing the abrasion are lining with rubber, glass, vitreous enamel, lead, and white heart alloy cast tiles.

Fuel Blending

Q.—Should we not pay more attention to fuel blending in this country?

A.—Yes. In Belgium, for example, it is quite usual in normal times to mix fuels to very close percentages, such as 16 per cent. of one, 17 per cent. of another, and so on; the whole secret is that industrialists there have laid out plant for that purpose.

Q.—Is the sandwich system for using coke breeze better than blending?

A.—Yes. The trouble of mixing is avoided and the ignition with the ordinary coal is perfect, while the breeze protects the grate from burning. On the other hand, there might be a little more trouble with clinker.

Q.—Can information be given on the burning of anthracite duff or pease mixed with bituminous coals?

A.—There is considerable difference of opinion and no useful conclusion can be reached. There are many variables which enter into the problem, such as type of grate, shape of furnace, size of fuel. Owing to the difference in burning characteristics of bituminous coal and anthracite, good combustion is not to be expected, especially with furnaces and grates not designed for such mixtures.

Q.—Can further information be given on slurry burning?

A.—A stoker designed for this purpose is working regularly at a colliery and giving trouble only when bolts and parts of waggon stays get into the fuel. The slurry contains up to 27 per cent. and down to 14 per cent. of moisture, with 27 per cent. of ash; 20 per cent. moisture gives the best results. The whole difficulty in handling slurry is to persuade it to go down the grate. Slurry should be burnt at the colliery to save transport.

Fire-Bars and Air Supply

Q.—Can information be given about fire-bars in relation to air supply?

A.—Reference should be made to a paper by S. F. Benson (*Inst. Mech. E.*, 1944) dealing with the jet air blower, in which it is shown that the use of loose top bars allows great leakage of air. Totally enclosed fire-bars are more effective; the tops do not burn as much, and although the first cost is higher, the difference is more than offset by the increased efficiency, while the distribution of the air is properly controlled. This system, while useful for dealing with ordinary fuels, becomes very much more valuable for low-grade fuels.

Another speaker suggested that it was important to have adequate resistance in the grate bars. If the fuel bed was 4-in. thick there should be a resistance in the grate bars of ½ in. to ¾ in. w.g., so that there should be a total of ¾ in. w.g. If the burning was more rapid at one point there would be an eruptive action and air which had only ¼ in. resistance as compared with ¾ in. at another place would pass through at the zone of lower resistance so much more quickly that there would be more rapid combustion there with fly ash. If, however, the fire-bar resistance was increased to 2 in., the relative differences would not be so great and the combustion would be more uniform all over the grate, even though the fuel bed was not equally level throughout. He regarded this as one of the most important features in burning coals of widely different sizing. The fan power must, of course, be increased to deal with the increased resistance.

Q.—Has the time factor anything to do with burning low-grade fuels?

A.—When fuels vary considerably in character more zones are required in order

to control them. A speaker pointed out that he used 5 or 6 zones in travelling-grate stokers in order to be able to handle fuels properly.

Q.—The smaller manufacturer having only one or two boilers, who is supplied with a wide variety of coal, is operating in conditions of special difficulty. Can any assistance be given to him? What is the best equipment for him to use?

A.—The most versatile stoker must be chosen and this is a matter upon which the manufacturers of the plant are the best fitted to oblige.

Q.—How can grates be prevented from burning?

A.—Before the war, when good coal was supplied, this was a very serious problem and it was decided to try a layer of ash. Although it increased operational costs it prevented the burning of the grates and a higher degree of air preheat could be used. It is now standard practice at that works. The ash was crushed and was put into a compartmented hopper so that the ash was delivered underneath the coal to a thickness of 1 in. Whether this practice is necessary to-day is a matter of opinion.

Q.—Is automatic control useful in helping to burn low-grade fuel?

A.—It has proved entirely successful.

A Versatile Stoker

Q.—Is it really correct to say that the underfeed stoker is selective in the type of fuel it will burn? The speaker pointed to one particular type of stoker which was claimed to be working equally efficiently with washed and dry slacks, coal and coke mixtures, mixtures of anthracite and coal, and open-cast coal provided that the largest pieces do not exceed 2½ in. Coals with caking characteristics should be burnt containing approximately 50 per cent. of fines below ¼ in. Particulars were given of a brick kiln fitted with only one stoker with which a temperature of 1750°C. had been obtained in a combustion chamber and which has given an almost uniform temperature of 1420°C. in the kiln. An ash bed 9 in. deep was formed from which the clinker could readily be removed after the kiln had cooled down.

A.—Underfeed stokers are quite versatile in the fuels they will burn and are very suitable for furnace firing. The necessity to break up coke "trees" arises, however, with certain high ash and coking coals.

Q.—In burning material containing up to 80 per cent. of fines considerable trouble is experienced with clinkering due to the low fusion point of the ash in the fines. How can this be dealt with?

A.—*Fuel Efficiency Bulletin* No. 20 issued by the Ministry of Fuel and Power should be consulted. In this is given the design of water sprays for this purpose which have been found very successful in operation. These can be fitted well with a forced-draught grate.

There was a discussion upon firemen and their duties, in the course of which it was suggested that there should be not only mechanical stokers but also mechanical handling. If firemen are to be skilled, their work must be lightened as much as possible, so that they can devote more time to the technicalities of their duties. Hand-filled hoppers, for example, should be replaced by mechanical handling, as if the firemen have to fill the hoppers they do not pay attention to the fire.

Design of Elevators

It was held that insufficient attention had been paid to the design of, and size of, elevators for lower grades of coal; and with mechanical elevators there is trouble due to choking the feed into the box or down the chutes. Often no arrangements are made to prevent water getting into the elevator pits; there is insufficient space for men to work round them and they are neglected.

Q.—What qualities of low-grade fuel may be expected in the future?

A.—A speaker pointed out that the qualities of fuels were changing and he doubted if they would ever return to an ash content of 8-10 per cent. A new grade of fuel might well appear, namely, middlings with 20-25 per cent. ash, and this seemed particularly likely in view of the recent Institute of Fuel discussion at Manchester on this subject. A type of fuel which might have to be burnt in large quantities in the future would contain 23 per cent. of ash and 7 per cent. of water.

LONDON OFFICE REOPENS

The reopening is announced of the London offices of Tanks & Drums, Ltd., of Bowling, Bradford, the well-known makers of metal containers (including steel drums and kegs for chemicals and oils), galvanisers, welders, and metal stampers. This event has been made possible by the return to civil life of their London manager, Mr. F. R. D. Corbett, D.S.C., who has been released after distinguished service in the R.N.V.R., into which he was called up at the outbreak of war. As a result of injuries received, he was discharged last February, with the honorary rank of Lieutenant-Commander.

The former offices of Tanks & Drums, Ltd., in Baker Street, having been destroyed by enemy action, the company has found a new London home in Windsor House, 46 Victoria Street, S.W.1 (telephone ABBey 3226), where Mr. Corbett is now in attendance.

Chemical Engineering Group

Annual General Meeting

THE 26th annual general meeting of the Chemical Engineering Group of the Society of Chemical Industry was held at the Waldorf Hotel on May 16, under the chairmanship of Mr. S. J. Tungay. The hon. secretary, Mr. R. F. Stewart, presenting the report of the general committee for 1944 stated that it was a most successful year despite the intensification of war conditions. Membership continued to rise and was now higher than it had ever been, and it was still on the upgrade. During the year, the revised edition of the Group's Handbook was sent out to members. All meetings for the discussion of papers were again held jointly with the Institution of Chemical Engineers. The report concluded with a brief reference to the historic events of 1944 both at home and the war fronts, and the view is expressed that if our future problems can be faced in the same spirit, we need not fear too much about what is ahead. The hon. treasurer, Mr. F. A. Greene, presented the accounts, which show a small surplus for the year.

The following officers and members of the committee were elected: *Chairman*, MR. M. B. DONALD; *hon. secretary*, MR. R. F. STEWART; *hon. treasurer*, MR. F. A. GREENE; *hon. editor*, MAJOR D. M. WILSON; *hon. recorder*, MR. H. W. THORP. *Committee*: MESSRS. L. J. BARLEY, J. D. BENNETT, A. C. MANNING, S. J. TUNGAY. A cordial vote of thanks was given to the honorary officers for their work during the year. An informal luncheon followed at which Mr. Tungay, the retiring chairman, expressed his appreciation of the help he had received. He also paid a tribute to the work of Mr. Mackie (assistant secretary) and to the staff.

Mr. M. B. Donald.

LETTER TO THE EDITOR

DDT and Gammexane

SIR,—In your issue of May 5 Mr. Pickett described a test in which he sought to compare DDT and Gammexane. For his experiment he chose some DDT obtained commercially, presumably containing 65-75 per cent. of the active constituent, and a Gammexane powder obtained from a fruit grower, which would contain only approximately 0.2 per cent. Gammexane. This is a test which can scarcely be described as scientific or expected to give a valid comparison. Indeed, in the circumstances Mr. Pickett's results were perhaps to be expected.

There is some confusion in the letter as to the relationship between 666 and Gammexane. This difference was made clear both in your article and by Dr. Slade (not Dr. Slater as quoted by Mr. Pickett). 666 is the name given for convenience to the product benzene hexachloride, which is made by chlorinating benzene. This contains approximately 10 per cent. of the active gamma isomer which we have called Gammexane. In any comparative tests it must be made clear whether 666 or the active isomer Gammexane is the unit of comparison. In Dr. Slade's paper Gammexane was used.

It might also be pertinent to remind your correspondent that the claims made by Dr. Slade for Gammexane were based upon a large number of comparative tests using a wide range of insect species, of which the grain weevil was only one.—Yours faithfully,

SIDNEY ROGERSON,
Imperial Chemical Industries, Ltd.

Hull Chemists in Action

Chemical Society Revived

THE Hull Chemical and Engineering Society held its annual general meeting at the Church Institute, Hull, on May 15. The hon. secretary, Mr. A. P. Backshell, in his report, announced that 24 new members had been enrolled, making the membership 107. Mr. Backshell also outlined the plans made for the forthcoming session after the four years' suspension of activities. The new session would begin on October 2, and would consist of meetings and lectures held fortnightly on Tuesday evenings at the Church Institute.

Mr. J. W. Bull, M.I.N.A., M.I.Mar.E., was elected president. Other officers were elected as follows: *Vice-presidents*: Dr. A. N. Mosses, F.R.I.C., Mr. H. C. Gripton; *hon. gen. secretary*, Mr. A. P. Backshell, F.R.I.C.; *hon. treasurer*, Mr. H. Foster. Messrs. E. H. Hall, H. N. Kay, F. Geary, E. E. Connolly, J. B. Moller, S. Amstell represent chemistry on the committee.

Imperial Chemical Industries

Annual Report and Accounts

AT the 18th annual general meeting of Imperial Chemical Industries, Ltd., held at Grosvenor House, Park Lane, London, W.1. on May 24 at 11.30 a.m., Lord McGowan reverted to the pre-war practice of addressing the meeting. An account of his review of the contribution made to the nation's war effort by I.C.I., will appear in a forthcoming issue.

In the annual report it is noted that the demand for the company's products has been maintained at a high level, although there has been some falling off in certain groups of Government requirements for war purposes. In particular, demand has expanded for the products of the dyestuffs and pharmaceuticals group. Relations with the various Ministries have continued to be most harmonious.

Capital expenditure on additions to or extensions of the company's fixed assets has been severely limited by the restrictions on materials and labour. During the year the company, which for some years had held through the Metals Group 2990 shares of £1 each in Fyffe & Co., Ltd., manufacturers of fittings at Dundee, acquired the outstanding 6010 shares. The company has disposed of its interest in the manufacture of incandescent mantles, etc., previously carried on by Lighting Trades, Ltd.

Continuing the policy of simplification of the group's structure, I.C.I. (Alkali), Ltd., and I.C.I. (Plastics), Ltd., were placed in liquidation as from December 31, 1944. These businesses retain their individual identities as operating divisions.

The civil complaint filed by the United States Department of Justice last year against E. I. du Pont de Nemours & Co., of Wilmington, Delaware, and this company, accusing them of violating the Sherman anti-trust laws, has remained in abeyance.

Export Revival

While concentration on the supply of material for the war effort at home has continued to curtail the quantities available for overseas markets, export business has been maintained and in certain directions expanded. Post-war prospects for export continue to be the subject of close study in order to restore and expand overseas trade with the least possible delay and to establish the sale of the new products, developed during the war, but the board's ability to increase the company's export business will depend on the rapidity of the release of many of its employees, the availability of shipping, and the allocation of material and labour for the erection of new factories.

During the year the board decided to seek the co-operation of the principal universities in the country in establishing a system of Research Fellowships in chemistry, physics or allied science such as physical chemistry, biochemistry, colloid science, chemotherapy, pharmacology, engineering, or metallurgy (*see* THE CHEMICAL AGE, July 29, 1944).

Personnel and Reinstatement

Mr. J. E. James, LL.B., who had been secretary of the company since 1929, retired on December 31, 1944, after 25 years' service with the company and its predecessors. Mr. R. A. Lynex has been appointed to that office. Mr. P. C. Dickens, the treasurer, resumed his duties with the company in March, 1945, after 5½ years' service with H.M. Forces.

Mr. B. E. Todhunter, O.B.E., retired from the board on December 31, 1944, after 44 years' service. He was one of the first directors of the company and rendered great services in the development of Imperial Chemical Industries of Australia and New Zealand, Ltd. Sir Frederick Bain has taken over his duties as personnel director.

On June 8, 1944, Dr. A. Fleck (Ammonia and Agriculture) and Mr. A. J. G. Smout (Metals), were appointed to the board. In addition, Mr. H. O. Smith has taken charge of the Explosives Group.

At the end of last year 12,810 of the company's employees were serving in H.M. Forces. It is regretted that by that date, 666 men had been killed in action, 473 were prisoners of war, and 67 are missing. In addition, up to December 31, 1943, 59 civilian employees lost their lives from enemy action. There were no losses from this cause in 1944. During the year, 35 of the company's employees were decorated by His Majesty for acts of bravery, making a total of 100 now so honoured.

Attention has been paid during the year to the reinstatement of employees on their discharge from war service. The company is anxious that every case should be treated with the utmost consideration and that its legal obligations should be regarded only as a minimum. Particular care will be taken to place in the most suitable employment those who are discharged suffering from any disability. Close contact will be maintained with the Ministry of Labour and National Service and all bodies concerned with the various aspects of rehabilitation and reinstatement.

During the year the standard factory working conditions, which were introduced by collective agreement with the Trade Unions in 1938, were reviewed and a num-

ber of minor modifications adopted, which represented, however, definite improvements in conditions of employment. On other questions of mutual concern with the Trade Unions, consultations have again been conducted in an atmosphere of entire goodwill and understanding. Long experience in these negotiations has created a happy mutual confidence. The board will look particularly to these excellent relations during the difficult period of transition from war to peace.

The Consolidated Accounts

The total gross income shown in the consolidated income statement is £18,194,047, compared with £18,704,627 for 1943. The decrease of £510,580 is mainly due to the re-negotiation of prices for Government supplies. The consolidated income for the year has risen from £7,042,172 to £7,223,271, an increase of £181,099 after providing, as last year, £2,500,000 for the Central Obsolescence and Depreciation Fund. The income for the year is £6,972,988 (compared with £6,685,345 for 1943) which, with the £1,062,018 brought forward from 1943, gives a total available of £8,035,006.

Since 1931 the board have been endeavouring to build up a reserve for income tax sufficient to cover the liability on the profits of the year, which has to be met in the year following. Numerous major taxation points affecting many past years are still undetermined, but as these points are cleared the board hope this reserve will become sufficient to achieve their purpose. Progress has also now been made in the agreement of war-time depreciation allowances sufficient to show that since 1940 the benefit to the company's income which has arisen on this account amounts to at least £1,000,000. In the board's view, such allowances will be required for the purposes for which they have been granted, and they have accordingly made a special appropriation this year of that amount to the Central Obsolescence and Depreciation Fund. The War Contingency Reserve remains unchanged at December 31, 1944, at £3,250,000. The Central Obsolescence and Depreciation Fund, which at the end of 1943 was £9,773,000, has been increased in the circumstances stated above by £3,500,000, and by the transfer of £27,000 from a liquidated company. On the other hand, the fund has been drawn upon for the purpose of writing down the assets of subsidiary companies and operating divisions to the extent of £1,025,000. The fund, therefore, stands at the end of 1944 at £12,275,000.

As already announced in THE CHEMICAL AGE on April 21, the directors recommend a final dividend of 5 per cent. on the ordinary stock, making 8 per cent. for the year. Details of the reserve allocations and of the dividends paid and provided are shown in the profit and loss account, together with the balance of £1,145,274 to be carried to 1945.

The aggregate gross manufacturing and trading proceeds for 1943 were £113,500,000; £65,000,000 was spent on raw materials and purchases for re-sale, maintenance of plants, freight charges, and factory and sales administration expenses (exclusive of personnel); £3,500,000 was set aside for obsolescence and depreciation of plants. That left £45,000,000 as the net proceeds of manufacturing and trading activities, to which there must be added the company's investment, property and miscellaneous income of £1,500,000, making a total of £46,500,000.

Of this £46,500,000, wages, salaries, pensions and contributions to pension funds took £33,500,000, and £9,000,000 was provided for home and overseas taxation, leaving £4,000,000, net after taxation, available for the company's reserves and net dividends to stockholders. Of this sum, £3,000,000 was distributed as net dividends and £1,000,000 added to reserves.

Storing Hydrocyanic Acid

Acetic Acid as Preservative Medium

A USEFUL note indicating a practical method of storing hydrocyanic acid is provided by V. K. Krieble and Robert Smellie, Jr. (*J. Amer. Chem. Soc.*, 1945, *67*, p. 690), of the chemistry department of Trinity College, Hartford, Conn., U.S.A., who report difficulty in obtaining prompt delivery of the acid owing to overlong detention of the metal storage cylinders on the part of users.

The authors find that hydrocyanic acid mixed with an equal volume of glacial acetic acid makes a solution which can be kept indefinitely. Such solutions have been kept for as long as two years with high summer temperatures and with no loss or deterioration of hydrocyanic acid. The containers never exhibit any pressure when opened. When hydrocyanic acid is wanted it is distilled out of the acetic acid through any ordinary fractionating column and the acetic acid used over again.

There is no difficulty in mixing the two acids. The hydrocyanic acid can be poured into a container holding an equal quantity of acetic acid and the container rotated until the solution is uniform. If glass bottles are used they should be insulated against breakage, preferably with an outside container filled with some absorbent material. The mixed acid solution should be poured and distilled in a well-ventilated hood only, with as much care as pure hydrocyanic acid.

Nitric Oxide*

The Estimation of Small Quantities in Coal Gas

by W. R. DUDDEN, A.R.I.C.†

DIFFICULTIES are experienced in the distribution of commercially-dried coal gas owing to the deposition of small quantities of gum in the needle valves and small orifices of modern gas-consuming appliances. This gum is formed by the reaction of certain unsaturated hydrocarbons, notably butadiene and cyclopentadiene, with nitrogen peroxide. The latter is formed from the nitric oxide present in the gas by reaction with the oxygen that is also present in comparatively large quantities, but this reaction is very slow, as the nitric oxide in purified gas seldom exceeds one part per million although the oxygen may be as much as one part per hundred. Consequently, a slow but continuous formation of gum takes place after the gas has left the manufacturing plant and the reaction is probably not complete when the coal gas is burnt at the consumers' appliances. It is of importance, therefore, to be able to estimate this small quantity of nitric oxide to ensure that it is kept at a minimum.

Methods already described for the estimation of nitric oxide in coal gas[1,2] rely upon the oxidation of nitric oxide to nitrogen peroxide by means of potassium permanganate. In the course of this reaction a sludge of manganese dioxide is precipitated, due to the oxidation of unsaturated hydrocarbons that occurs at the same time. Thus, the strength of the permanganate solution varies and, in the case of the continuous apparatus, trouble is also experienced owing to the sludge blocking the gas way of the spiral washer. The apparatus illustrated in Fig. 1, which can be obtained from Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2, was devised in order to overcome this difficulty.

The method of estimation depends upon the conversion of these small quantities of nitric oxide quantitatively to nitrogen peroxide by reaction with the nascent oxygen formed at the anode of an electrolytic cell. The reaction is complete in a fraction of a second. Nitrogen peroxide is formed and this is reacted with Griess reagent, where it first appears to unite with water to form nitric and nitrous acids, the latter then combining with the reagent to give the coloured diazo compound. Therefore, in this method, the colour developed is due to one-half of the nitric oxide present in the gas and it is not necessary, as in the permanganate methods, to standardise the conditions and use an empirical factor.

* Communication No. 270, Inst. of Gas Engineers.
† Of The Gas Light and Coke Company.

The apparatus, Fig. 1, is a modification of that previously described.[3] A porous pot, consisting of a short length of a fireclay tube, obtainable from the Morgan Crucible Co., Ltd., London, S.W.11 (Cat. No. T. 3811), is wound with six turns of 24 s.w.g. platinum wire and the whole enclosed in a glass tube, B, having a gas entry at C and exit at D; it is not necessary for this wire

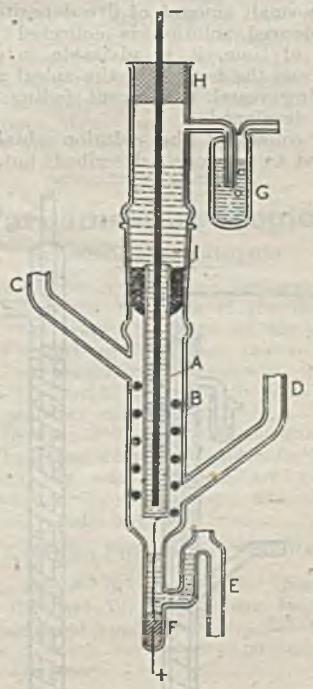

Fig. 1.

to be in contact with the walls of the glass tube. The porous pot is cemented into the B 19 standard joint, I, and filled with 5 to 10 per cent. sulphuric acid. The platinum wire makes contact with a source of current, either from D.C. mains or a six-volt accumulator *via* the mercury cup F, and the other electrode is formed from a lead wire passing through the rubber bung, H, into the acid. A current of 0.4 to 0.6 amp. is then passed through the cell. The current can be ascertained, after a preliminary calibration, by counting the hydrogen bubbles evolved in the bubbler, G. About two ml. of acid per hr. will permeate through the porous pot. The platinum wire is made

the anode of the cell and gas is passed through at a rate of ½ to 1 cu. ft. per hr.

The gas leaving the apparatus is taken to the spiral washer, Fig. 2, down which Griess reagent, prepared as described in a previous paper[2], flows at a rate of 60 to 100 ml. per hr. The inlet of this washer is so arranged that the gas passes through a small seal of the reagent, as this increases the efficiency of the washer. After a period of time, some discoloration of the spiral takes place due to a slight precipitation of the diazo compound; while this is insufficient to affect the result, it can be considerably reduced by the addition of 5 to 10 per cent. of acetone to the Griess reagent, the acetone re-dissolving the small amount of dye deposited. As the coloured solution is collected over a period of time, it is advisable to exclude light from the bottom of the spiral and the collecting vessel to prevent fading of the colour developed.

The colour of the solution obtained is matched as previously described[1] but, owing

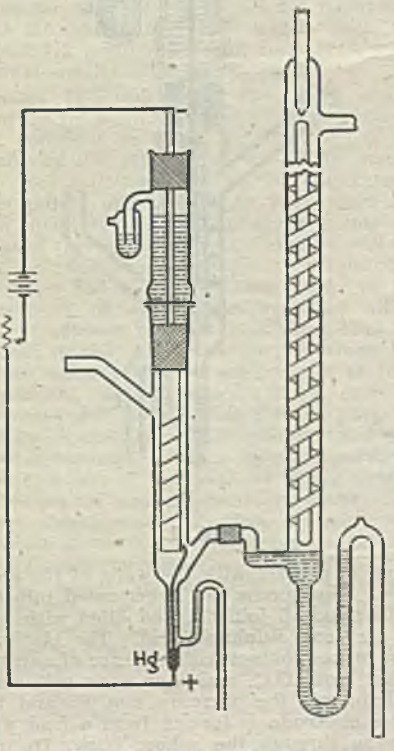

Fig. 2. Spiral Washer.

to the changed factor, the strength of the sodium nitrate solution should be 0.041 g. per l. for gas saturated with water vapour at 0°C. and 760 mm. Hg. A Lovibond tintometer can be used for matching, when for one cu. ft of gas passed and 50 ml. of solution collected $\lambda = 0.12$ p.p.m. for gas saturated with water vapour at 0°C. and 760 mm. Hg. The nitric oxide content of the gas can be calculated thus:

$$\text{Nitric oxide, p.p.m.} = \frac{1.12d \times a}{b \times c}$$

where a = volume of solution collected
b = volume of solution used as blank in tintometer
c = gas passed at S.T.P. saturated with water vapour
d = reading of tintometer in

The advantages of the method are: (1) The apparatus can be used for short-period tests, as a result can be obtained in 15 min.; (2) the test will run for long periods without attention and can be used as a nitric oxide recorder if combined with a photoelectric matching unit such as that of the recorder developed by the United Gas Improvement Co., Philadelphia; (3) rapid changes in nitric oxide concentrations can be observed; (4) the apparatus is compact, and easily constructed; (5) it is not necessary to use Friedrich washers or sintered glass gas washbottles which are, at the present time, difficult to obtain.

Thanks are tendered to the Directors of The Gas Light and Coke Company in whose Fulham Laboratory the work has been conducted.

REFERENCES.

1 HOLLINGS, *Trans. Inst. Gas Eng.*, 1936-37, *86*, 547.
2 HOLLINGS, *Trans. Inst. Gas Eng.*, 1936-37, *86*, 847. (*cf. Gas J.*, 1937, *218*, 523; *Gas World*, 1937, *106*, 500).
3 B.P. 496,721/1937. Gas Light and Coke Co. and W. R. Dudden.

Waste Acid Recovery

New Swedish Explosives Process

A NEW method of utilising waste products from the manufacture of explosives has recently been invented by Mr. Gösta Wallerius, chief engineer of the Express-Dynamite Company, of Grängesberg, Sweden, and a gold-medallist of the Royal Swedish Institute for Engineering Research. His method is stated to have given satisfactory results under test. Previously, the nitric and sulphuric acids formed in the stabilisation of nitroglycerine and nitroglycol were allowed to run to waste. By means of the new process it is possible to extract 12 to 15 per cent. of these acids in a highly concentrated form. At the above company alone it is estimated that 150 tons of concentrated nitric acid and 10 tons of concentrated sulphuric acid can be extracted annually. Furthermore, the new method yields an increased output of nitro-products as well as causing a reduction in the consumption of soda. Another advantage is that lakes or rivers adjoining explosives factories need no longer be polluted by waste acids.

Personal Notes

MR. G. H. WAKEFIELD has been elected a director of Lansil, Ltd.

MR. G. S. RUSHBROOKE has been appointed to a Brotherton Research Lectureship in Physical Chemistry at Leeds University.

SIR EDWARD APPLETON, secretary of the D.S.I.R., is to receive the honorary degree of Doctor of Science of Leeds University.

PROFESSOR FREDERIC JOLIOT and MADAME IRENE JOLIOT-CURIE, joint Nobel prize-winners, will receive the degree of LL.D., *honoris causa*, of Edinburgh University, on June 22.

DR. R. K. LAMOUR, professor of chemistry in the University of Saskatchewan, has been appointed director of the National Research Council's Prairie Regional Laboratory, which is to be built in Saskatoon.

LIEUT.-COL. J. T. WHETTON has been installed in the Chair of Mining at Leeds University. An M.Sc. of Leeds University, he is at present adviser on coal production in the Ruhr, and will take up his appointment on October 1.

New sectional presidents in the Society of Chemical Industry include MR. STANLEY ROBSON (the Society's honorary foreign secretary), elected in the Bristol section, and MR. C. GYSIN, in the Manchester section.

DR. J. F. J. DIPPY, member of Council of the Royal Institute of Chemistry, and head of the chemistry department at Wigan Mining and Technical College, has been appointed head of the science department at the South-East Essex Technical College, Dagenham.

MR. H. W. GRAESSER-THOMAS, of Yorkshire Tar Distilleries, Ltd., has been re-elected chairman of the Council of the British Plastics Federation and of the Federation itself for 1945/46. DR. F. J. WORROYS, of Imperial Chemical Industries (Plastics Division), Ltd., was re-elected vice-chairman.

DR. L. P. KYRIDES, research director of the Organic Chemicals Division of Monsanto Chemical Co., is to receive the first Mid-west Award of the American Chemical Society, while DR. L. H. CRETCHER, assistant director of the Mellon Institute and head of its pure chemistry research department, receives the Society's Pittsburgh Award.

PROFESSOR C. H. LANDER, who has been awarded the Melchett Medal for 1945, by unanimous vote of the Council of the Institute of Fuel, has done work in connection with fuel during the past thirty years. He was Director of Fuel Research from 1923-31 and has published work on many aspects of the subject, including low-temperature carbonisation.

Among those who have been appointed managers of the I.C.I. Research Fellowships Fund by the Senate of the University of Cambridge, the following represent the chemical faculty: DR. F. P. BOWDEN (physical chemistry); PROFESSOR A. C. CHIBNALL (biochemistry); PROFESSOR A. S. TODD (organic chemistry). Elections to fellowships will be announced this term.

LIEUT.-GEN. SIR RONALD WEEKS, who has been appointed chief representative for control questions in Germany under Field-Marshal Montgomery, and also a director of the new Government-owned Finance Corporation for Industry, Ltd., under the chairmanship of Lord Hyndley, is particularly suited to keep an eye on the activities of the German chemical industry. In addition to his military service as deputy-chief of the Imperial General Staff and Director-General of Army Equipment, he is a director of Pilkington's, Ltd., and has been a mining engineer and a research chemist.

Parliamentary Topics

Scientific Instruments

IN the House of Commons last week, Mr. Salt asked the President of the Board of Trade what were the plans of his department to ensure an immediate release in the output of scientific instruments in this country to provide for research work essential to post-war industries.

Mr. Dalton: The scientific instrument industry has been greatly expanded during the war, and, as war contracts are reduced, ample capacity should become available for peace-time production.

Aviation Fuel Requirements

Sir A. Sinclair informed Sir E. Spears that during the last 12 months the Royal Air Force had used approximately 1,250,000 gallons of aviation fuel a day on operations against Germany.

Chemical Defence

Mr. Salt asked the Minister of Supply what steps he proposed to take to dispose of the chemical warfare experimental stations to the best national advantage.

The Joint Parliamentary Secretary to the Ministry of Supply: The Chemical Defence Experimental Stations, the activities of which include work on smoke-screening and insecticide applications, must for the present be maintained to meet the demands of the Japanese war. Their future beyond this period is now under consideration.

Mr. Edmund Harvey: Will the Minister keep in mind the needs of university research departments?

Mr. Wilmot: Certainly, but the demands of the Japanese war must come first.

General News

From Week to Week

Mineworkers in Northumberland collieries have contributed £21,000 in pennies to the Red Cross Penny-a-Week Fund.

Specification DTD: "Chromium Bronze Bars, Extended Sections and Tubes" (incorporating Amendment List No. 1) has just been reprinted (H.M.S.O., 1s.).

Among bequests made by the late Charles Stewart Crawford, retired dyestuffs and chemical manufacturer, is included a sum of £5000 to the Royal Technical College, Glasgow, to provide scholarships in chemistry.

The Council of Leeds University accepted at its recent meeting I.C.I.'s offer to make available £4800 a year under deed of covenant for seven years to establish eight research fellowships in chemistry or physics or any allied science.

All the seven retiring members of the council of the Pharmaceutical Society of Great Britain were returned at the election of which the result was announced this week. Mr. Walter Deacon, C.B.E., Bridgwater, headed the poll.

Wholesale prices for chemicals and oils remained unchanged last month at 150.5. Compared with April, 1944, the index fell by 1.1. The figure for iron and steel rose from 187.9 to 189.4 (183.0) while the index for non-ferrous metals continued its decline by three points to 123.1 (127.4).

So heavy have been the landings of fish in the Aberdeen area lately, that fertiliser manufacturing firms in the area, at present working to capacity, have been forced to refuse offers of more fish, a position in which they have not found themselves since the outbreak of war.

An interesting feature in the survey of the Kent coalfield, recently issued by the Ministry of Fuel, is the reference to the large iron-ore deposits, which are said to be suitable for smelting in specially-designed blast furnaces. It is estimated that over 1,000,000 tons of ore a year could be produced, with reserves for over 100 years.

Agar-agar and its supply is the subject of the principal article, from the chemical viewpoint, in the spring number of *Endeavour*, which continues to give an excellent picture, to overseas readers, of British scientific achievement. Mrs. L. Newton is to be congratulated on her clear and concise account, with admirable illustrations, of the methods of harvesting the suitable seaweeds. Dr. E. G. Richardson contributes a valuable description of the science of rheology; and Mr. C. J. P. Cave's pictures of cloud formations, though nothing to do with chemistry, cannot fail to fascinate.

Queen Mary College, of the University of London, is advertising for an assistant lecturer in physical and inorganic chemistry, the appointment to date from September 1. It is stated that the appointment is to be taken up in London, to which the college is presumably about to return after its period of exile in Cambridge.

The Trading with the Enemy (Specified Persons) (Amendment) (No. 6) Order, 1945 (S. R. & O. 1945, No. 494) contains mainly deletions from the list of persons in neutral countries with whom dealings of any kind are unlawful. There are, however, 40 new additions, including: "Fominco" S.A. Comercial, Industrial, y Minera Argentina, Buenos Aires; and Produtos Quimicos, Ltda., "Iba," S. Paulo, Brazil.

British Standard Specification BS/ARP/57:1941, which deals with the rot-proofing of sandbags, has been revised and is now re-issued as B.S. 1214:1945. Section 1 of the specification deals with the hessian itself and the method of manufacturing the bag. Section 2 schedules the approved rot-proofing processes. Copies can be obtained from Publications Department, B.S.I., 28 Victoria Street, London, S.W.1 (2s., post free).

The Purchase Tax (Suspension of Registration Limit) Order, 1945, which will come into operation, subject to the approval of the House of Commons, on July 1, abolishes the present exemption from registration and tax of small manufacturers and others whose sales of goods liable to purchase tax do not exceed £500 a year. Accordingly, all persons concerned will now be required to apply for registration unless they are already registered. Form of Application P.T.1C., together with a list of goods liable to purchase tax, may be obtained from any Officer of Customs and Excise or from the Secretaries' Office, Customs and Excise, City Gate House, Finsbury Square, London, E.C.2.

To prevent the death by starvation of over 60,000 Dutch persons who have reached a condition that makes normal digestion of food almost impossible, two shipments totalling 16,000 lb. of a protein preparation known as Amigen have been flown from the U.S., the F.E.A. announces. In producing Amigen, crude hog pancreas is added to casein. The enzymes of the pancreas break down the casein into amino-acids during a two-day incubation period. This provides an element which is readily assimilable in the bloodstream, and which nourishes the body until its normal digestive function is restored. These shipments will supplement supplies in the United Kingdom which have already been drawn upon to aid the Netherlands.

Chemical fertiliser manufacturers in Scotland report that there has been a definite clearance of fertilisers after a slow start to the season, and that supplies of compounds have been largely eliminated. There is still a fair demand for compounds and for nitro-chalk and sulphate of ammonia. Nitrate of soda is also in demand but supplies are very limited.

The managing director of Ind Coope and Allsopp, Ltd., Burton-on-Trent, records, in a letter to *The Times*, an interesting centenary. When Allsopp's laboratory was started in 1845, a qualified chemist, Mr. H. Bottinger, was appointed on the recommendation of Professor Bunsen, thus initiating a practice which has been maintained for 100 years. The present head chemist, Mr. H. E. Dryden, has been with the firm for 36 years.

Foreign News

Santobane is the trade name given by the Monsanto Chemical Co. to DDT.

The production of high-grade salt is to be taken up in a plant to be established by Maritime Industries, Ltd., a new subsidiary of the Standard Chemical Co., Ltd., at Amherst, Nova Scotia. A large proportion of the output will replace salt now imported.

A special penicillin commission has been set up in the U.S.S.R. by the People's Commissariat for Health Protection. Mass production is to commence as soon as possible and two factories in Moscow are now being equipped for the work.

Rich nickel deposits in Nivalo, near Petsamo, the Arctic nickel-mining town, which was incorporated into the Soviet Union after the end of the Russo-Finnish war, are to be further investigated with a view to their exploitation.

A cement factory is to be established in Ceylon at a capital cost of Rs. 8,000,000. The Department of Commerce and Industry has ascertained the existence of enormous supplies of high-grade limestone in the Jaffna peninsula.

The U.S. Alien Property Custodian is to make available for public inspection all patents and contracts owned by U.S. companies in which enemy nationals have an interest. A total of 771 patents and contracts have been seized; 500 have been registered, while others will be filed in the next few weeks.

A new toluene plant is being constructed for the U.S. Government at a cost of $20,000,000 at Lake Charles, La. It will be one of the largest of its kind in the country, having a capacity of 2,000,000 gallons of toluene a month. The plant will also produce 55,000 tons of butadiene yearly and 20,000 barrels of high-octane petrol daily.

Military consumption of copper in the U.S. will be reduced about 15 per cent. from the current level estimates the W.P.B. copper division. In terms of refined copper content, the saving would be approximately 148,000,000 lb. quarterly.

In the liberated areas of the U.S.S.R., 1600 food factories have been reconditioned during the past two years. Among these, pre-war production level has been reached by 100 sugar mills, 26 canneries, 80 distilleries, 42 vegetable oil mills and 600 bakeries.

In the Donets coal basin already 110 of the biggest mines have been restored, and 125 new mines will be sunk in the next three years—25 of the latter, with a planned capacity of 9,000,000 tons, have already been begun.

The United Nations' petroleum needs exceed 7,000,000 barrels a year, according to Mr. R. K. Davies, Deputy U.S. Petroleum Administrator. Of this, the United States is called upon for 4,850,000 barrels or 69 per cent.; South America, 14 per cent.; the Middle East, 7 per cent.; Russia, 9 per cent.; and the remaining 1 per cent. from miscellaneous sources.

A new babassu oil factory, owned by the Industrias Babaçu Limitada, recently went into production at Queluz in the State of Maranhao, Brazil. The initial production plan divides the plant into a factory capable of breaking 150 tons of nuts daily, a pilot distillery capable of distilling 10 tons of shells a day, and an oil factory.

Some useful notes on the production of tung oil in the British Empire are contained in the current issue of the *Bulletin of the Imperial Institute* (1945, *43*, 1, p. 14). In the Union of South Africa it is estimated that there were about 130,000 trees, in addition to 100,000 in Swaziland; the 1943 crop yielded 270 tons of oil. In Nyasaland the acreage under tung trees was 6847, compared with 51 in 1932. Promising but less definite results are recorded from India, Burma, and Australia.

Forthcoming Events

May 30. The Institute of Fuel (Midland Section). James Watt Memorial Institute, Birmingham, 2.30 p.m. Mr. A. W. Payne: "Power from Process Steam."

May 30. Society of Chemical Industry (Plastics Group). The Royal Institution, Albemarle Street, London, S.W.1. 3 p.m. Mr. H. V. Potter: "Leo Hendrik Baekeland—The Story of His Life" (First Baekeland Memorial Lecture).

May 30. Society of Chemical Industry (Plastics Group). Stewart's Restaurant, 50 Old Bond Street, London, W.1. 11 a.m. Annual General Meeting. Luncheon:

12.30 for 1 p.m. Applications from members, accompanied by a remittance for 6s. 6d., should be made to the Hon. Hospitality Officer, Mr. W. H. Langwell, The Garth, Windmill End, Epsom.

May 31. The Institute of Fuel. Conference on Industrial Insulation. Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.1, 10.30 a.m. and 2.30 p.m.

Commercial Intelligence

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

Satisfactions

STOCAL ENAMELS, LTD., Birmingham. (M.S., 26/5/45.) Satisfaction May 2, of debenture registered February 10, 1942.

MACROME, LTD., Alcester, metallurgists. (M.S., 26/5/45.) Satisfaction May 2, of charge registered August 29, 1935.

Company News

The British Drug Houses, Ltd., announce the payment of an ordinary dividend, for 1944, of 4 per cent. (3 per cent.).

Alterations in the memorandum of the **Distillers Co.** authorising the company to engage in the manufacture of plastic moulding powders, penicillin and a variety of alcohol derivatives were approved at an extraordinary general meeting held on May 17.

New Companies Registered

Neltex, Ltd. (395,247).—Private company. Capital, £2000 in £1 shares. Manufacturers, exporters and importers of and wholesale and retail dealers in fine and heavy chemicals, essential oils, aniline and other dyes. Directors: J. A. Smith; A. E. Pickles; C. W. Hunt. Registered office: 171/3 Alfreton Road, Nottingham.

Northfleet Chemicals, Ltd. (395,248).—Private company. Capital, £3000 in £1 shares. Manufacturers, merchants, importers and exporters of chemical compounds, etc. Subscribers: J. L. Feuchtwangen; W. H. Stocks. Registered office: 4 Lloyd's Avenue, E.C.3.

Celands (Export), Ltd. (395,395).—Private company. Capital, £2000 in £1 shares. Manufacturers, exporters and importers of and dealers in chemical products, fine and industrial chemists, etc. Directors: R. Golken, C. Landsman. Registered office: 38 Rectory Road, London, N.16.

Plasticisers, Ltd. (395,431).—Private company. Capital, £1000 in £1 shares. To coat and/or impregnate vegetable, animal or artificial fibres with plastic materials; manufacturing chemists, etc. Subscribers: Miss C. Ferdinand, Mrs. H. Eddison. Solicitors: Wilfred Dunn and Connell, Parkinsons Chambers, Hustlergate, Bradford, Yorks.

Midland Vermicide, Ltd. (395,246).—Private company. Capital, £1500 in £1 shares. Industrial pest control servicing operators, manufacturers of and dealers in insecticides, disinfectants, etc. The directors are: F. W. Whitehead; S. Mason. Registered office: 54 Guildhall Chambers, Navigation Street, Birmingham.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets continued on a small scale and the tendency was reactionary, with the exception of British Funds. A fair amount of attention was again given to rubber, tin and other Far Eastern shares. Industrial shares showed a downward trend earlier in the week, sentiment reflecting a waiting attitude because Government policy in regard to many important industrial and allied problems will depend on the result of the General Election.

Imperial Chemical at 39s. 6d. became firmer on further consideration of the full results and the prevailing belief that there seem to be good prospects of the dividend being maintained at 8 per cent. in post-war conditions. After easing on the past year's figures, Dunlop Rubber were steadier at 50s.xd., in view of the fact that although the dividend is again limited to 8 per cent. approximately 13⅜ per cent. was earned. United Molasses eased to 42s. 1½d. after renewed firmness on the full results. British Oxygen at 83s. 3d. hardened following the chairman's remarks, and British Match at 43s., and British Aluminium at 41s. 9d. were little changed on balance.

Iron and steel shares recorded moderate declines although after an earlier reaction, Stewarts and Lloyds deferred steadied at 55s., sentiment reflecting the results and the company's big post-war plans. Elsewhere, Hopkinsons at 82s. 3d. were higher on the increased distribution, and Davy Engineering were supported on current views of post-war prospects. The units of the Distillers Co. eased to 114s. 3d., despite the talk of a possible increase in the forthcoming dividend. British Plaster Board at 37s. 6d. regained part of an earlier decline, and Borax Consolidated at 43s. were little changed. Lever and Unilever eased to 47s. 6d., and Turner and Newall to 82s. Wall Paper Manufacturers deferred showed steadiness at 43s. Shares of companies with interests in plastics tended to firm up, but later eased with De La Rue £10 11/16, British Industrial Plastics 2s. shares at 7s., and Erinoid at 12s. 3d. In other directions, hopes that the future holds scope for higher dividends were

reflected by firmness in Barry and Staines at 53s., and in Nairn and Greenwich at 77s. 6d.

Textiles became easier on the reduced earnings of Fine Cotton Spinners. Shares of the latter receded 1s. 9d. at 23s. 9d., more than the maintenance of the dividend at 4 per cent. having been expected in the market. British Celanese reacted to 32s., and Courtaulds to 55s. Following the preliminary statement showing maintenance of the dividend at 15 per cent., B. Laporte have changed hands around 89s. Burt Boulton marked 27s. 3d., and pending the dividend statement, Canning Town Glass 5s. shares transferred around 10s. United Glass Bottle marked 77s. 6d., Cooper McDougall 32s. 6d., and British Drug Houses showed business up to the higher level of 34s. Fisons marked 50s. 9d. at one time, and Greeff-Chemicals Holdings 5s. shares 9s. 1¾d. Blythe Colour Works 4s. shares remained under the influence of the results issued some while back, dealings continuing around 20s.

Boots Drug were 55s., Sangers 32s., Timothy Whites 43s., and Beechams deferred 19s. 4½d. Elsewhere, Birmid Industries at 94s. lost part of their recent advance. Amalgamated Metal at 19s. 9d. and Imperial Smelting at 13s. 9d. became easier in accordance with the prevailing market trend. Gas Light and Coke at 23s. 1½d., however, were well maintained. Imperial Continental Gas stock rose from 116 to 133 following the resumption of dividends with a total of 10 per cent. Oil shares were generally easier, with Anglo-Iranian 106s. 10½d. and Shell 85s.

British Chemical Prices

Market Reports

TRADE in general chemicals in the London market during the past week has been on quiet lines, although it is apparent that conditions are gradually reverting to normal. There is little alteration in the supply position and values throughout the market remain firm. Among the soda products, offers of chlorate of soda are none too plentiful and no change is reported in the position of yellow prussiate of soda and bichromate of soda. Both grades of hyposulphite are firm and in good request and a fair inquiry has been made for the phosphates of soda. In the potash section, supplies of caustic potash are being steadily absorbed, while the pressure for deliveries of permanganate of potash is well maintained. Offers of yellow prussiate of potash continue scarce, while there is a fair demand for acid phosphate of potash at firm rates. In other directions, white powdered arsenic is steady, and borax and glycerine are in good call, while a fair trade is passing in hydrogen peroxide. The trade in coal-tar products is quiet. A moderate inquiry is reported for carbolic and cresylic acid and the xylols are steady. The toluols and benzols are in good request and there is a fair inquiry for solvent naphtha.

MANCHESTER.—From the point of view both of contract deliveries and of actual new inquiry and business, trading conditions on the Manchester chemical market during the past week has been slower. This has been due primarily to the Whitsun holiday, which in this part of the country has brought business during the greater part of the week pretty well to a standstill. Trade in the tar products has been similarly affected. From the beginning of next week, however, it is expected that conditions will be back to normal, and steady trading in most sections is looked for. In the meantime, compared with the last report, values are on a steady-to-firm basis and little actual change has occurred.

GLASGOW.—In the Scottish heavy chemical trade during the past week home business remained steady with no actual changes in prices to report. Owing to the changed position in Europe, export inquiries are becoming more numerous.

SERVICING

CAPACITY available for manufacture and bottling of solutions, creams, emulsions, corrosive fluids, etc. Laboratory control if desired. Enquiries to Box 2218, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

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

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

TRANSLATIONS, Scientific and Commercial, from and into English, German, French, Spanish by expert. Reasonable charges. Dr. Fry, 58, Warwick Avenue, London, W.9.

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