The
Chemical Age

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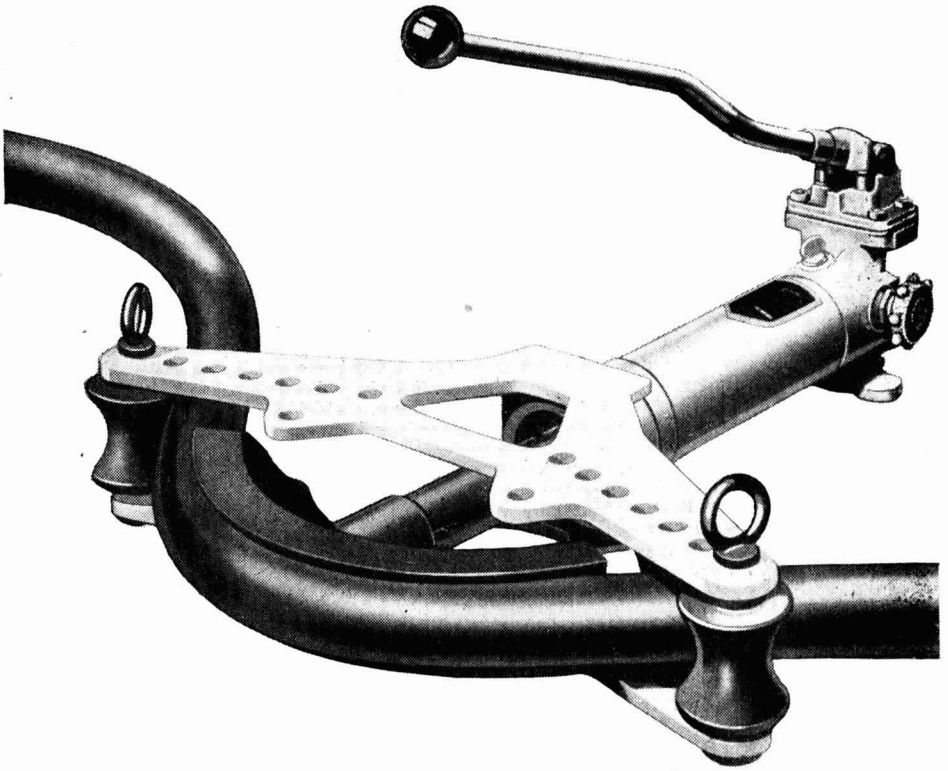

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The Commerce of Chemistry

THE Royal Institute of Chemistry's Thirteenth Gluckstein Memorial Lecture was delivered recently by Mr. John Rogers, who most fittingly chose the subject, 'Commercial Aspects of the Chemical Industry.' Few men are better equipped to survey this theme today. 'When I started as a chemist in a certain factory . . .' began one of his mid-lecture sentences; the position of commercial and industrial eminence that Mr. Rogers ultimately reached is too well known to require specification in these pages. The journey of such a chemical career, a journey of constantly changing scenes and climates, is rich with traveller's tales. Young chemists will be well advised to study the published lecture. Experience all too often has to be gained by trials and errors, yet it can be partially acquired by sharing other people's. Students accept readily enough the authority of academic giants, but they are often oddly reluctant to sit at the feet of eminent men of industry.

Mr. Rogers, in his lecture, exposes the facility of such statements as 'all we have to do is to secure 1 per cent of the US home market.' 'If we attempted this with a few kinds of chemicals and had considerable success, our American counterparts would raise much disturbance and lobby in Washington to get tariffs raised to prevent importation. On the other hand, if the 1 per cent were attempted in a very wide range of chemicals, sales costs would be high—at times prohibitive.' Another comment of Anglo-American significance might also be quoted: 'The Americans, even when very young, appear to have more appreciation of dollars and cents, and to be more commercially minded than the British despite our history as a trading nation.' Here, perhaps, 'despite' is the wrong word and the phrase 'because of' would have been more accurate. For far too long in our history as a trading nation, selling was too easy; when we were indeed a nation of shopkeepers (and workshop-keepers) we offered the world goods that other nations could not offer or make for themselves.

Competition no longer means what it once did. Business is less and less to be obtained by price adjustments, 'accompanied, as they very frequently were, by bribery, backhanders, presents, and the like.' Quality and service, co-operative understanding between the two firms who are buying and selling, the disclosure of information about each other's processes, and even technical research that enables a consuming firm to use less of the material supplied, these are the modern methods of competition that are spreading through the chemical industry with high velocity. In this matter it is scarcely unnatural for the chemical industry to be somewhat in advance of other industries for it is unique in that most of its sales are made to other industries rather than to the public.

Monopoly also has a greatly changed meaning. 'In almost all industries of the mass-production type, overhead costs are very large, and a high rate of production is essential . . . at such times (times of bad trade and depression) small concerns

with low overheads can maintain themselves through difficult conditions by taking orders at low prices, which large companies could not accept without serious loss . . . I do not wish to be thought in favour of monopolies, nor do I wish you to think it possible that I could be well disposed to senseless competition, simply because it lowers sales prices, for the time being at any rate. In these days, competition among reputable firms in the chemical industry does not manifest itself in that way . . .'

On these two interwoven topics of commerce, competition and monopoly, there is a profound difference in outlook between the vastly experienced industrialist and what, for want of a better term, we might call the 'well-intentioned planner.' The planning mentality abounds in local government, and how often councils and committees buy materials or supplies at the lowest tendered price and in utter disregard of the service and co-operation also offered by firms whose quotations have been higher. Much rough and tumbling experience of commerce is needed to reach the deeper outlook that reduces the price factor to its proper place and places an adequate emphasis upon service. To the same type of mentality—the well-intentioned planner—monopoly is a means to one end, the extraction of 'take-it-or-leave-it' prices from consumers. To the industrialist, responsible for huge capital investment in large-scale production processes, processes that his company may in many cases have pioneered, some degree of monopoly, albeit no more today than the preservation of patent rights, is simply a protective measure to ensure that productive capacity works at a fair price in bad times as well as good. There is probably not a critic of monopoly-tending restrictions who would not see worse evils in 'senseless competition' had he been through the same direct experiences as any industrialists of this century.

On the new branch of commerce and industry, 'Public Relations,' Mr. Rogers expressed somewhat suspicious views. 'These relations are established by the behaviour and performance of the firm as a whole and as individuals. The whole staff must be, by the confidence other people have in them, the custodians of proper public relations, and that is not achieved by writing and talking alone . . . I always feel sceptical about any answer to criticism or complaint taking the form of a letter to the Press signed by "Public Relations Officer." ' It is, of course, only too true that a company's place in public opinion or the sectional opinion of a particular trade or market is basically made or marred by its staff behaviour; but it is scarcely fair to the efficient Public Relations Officer to suggest that he represents some other and less effective route to goodwill. The Public Relations Officer who genuinely knows his job would agree whole-heartedly with Mr. Rogers' views, but he would also add that one of his principal duties was to induce a better consciousness of public relations in his company's staff. Indeed, it might well be said that the best Public Relations Officer is a somewhat invisible man whose work is widely noticeable, but whose signature is little known.

As a collective organisation the chemical industry needs good public relations work badly—the very nature of its indirect contact with the public encourages dangerous misunderstandings. The industry's fetish for secrecy, now almost a skeleton in the cupboard, was discussed by Mr. Rogers with all the wisdom of long experience. Not even the Americans (we are told) are as open in showing 'all the works' to visitors as we popularly believe. If secrecy about obvious practices and processes pervades the industrial scene, there is an absurd wastage of time and effort and little opportunity to gain from other firms' experiences. But a short-term secrecy that enables a company to establish a reasonable start in some new process is fair and sensible enough. The reaction from excessive secrecy in the past may swing too far in the other direction. This is certainly an aspect of chemical commerce on which Mr. Rogers' views should be regarded as authoritative, for his company has long displayed a fine judgment in the difficult equilibrium between secrecy and freedom of information.

Notes & Comments

Degree Men for Selling?

A RECENT survey by questionnaire, conducted in the US chemical industry, showed that over 90 per cent of companies favoured technical men for selling chemicals. A degree background was insisted upon by just under 30 per cent so it would seem to be a matter of 'technical training needed' whether or not sanctified by an academic hallmark. The view that such training handicaps a salesman, 'tending to make him excessively concerned with details,' though deliberately put forward in the questionnaire, was ignored by all the firms who replied. One company, unable to get enough men with degrees, took on and trained men without; this proved successful, but progress was not made as speedily as by men from good universities. 1953 may be too early a date in the post-war period for this sort of assessing. There have been several years of seller's market conditions and scarcely two years of balanced supply and demand. The art of selling has scarcely had to function, and in such a climate the purely technical representative should have flourished especially well. Over several years of a buyer's market, will the technically trained man put up a similarly competent performance? The query may be too specific. Younger salesmen of all types and in all industries have yet to be tested in the fire of a real buyer's market, and it remains to be seen how many of them, however successful in their former capacities as quota-distributors, fall by the wayside. Technical salesmen may prove to be more firmly entrenched simply because they have been able to give more knowledgeable service during the easier years.

Scandal in Sussex

THE men of Sussex, as those who know their Belloc are aware, come from no common breed. Even 600,000 years ago (so, until last Saturday, it seemed) they had this reputation: they had an ape-like jawbone where no such thing should be, different parts of their skulls evolved at different rates—even then how strange, how veiled in Cold Comfort gloom, must they have appeared to their neighbours, the Kentishmen of Swanscombe. But chemistry once again has done a dreadful thing—the Piltdown men, progenitors of those epic tosspots of the Weald, are frauds, fakes, never have existed. Let Mr. Alvan Marston, dental surgeon, anthropologist and discoverer of the Swanscombe skull, scorn the theories of the British Museum, it seems that the chemical evidence in this case is irrefutable. That both the fluorine content and the organic nitrogen content should differ so markedly between the mandible and the cranium is highly significant; when further analysis has shown a 'paint-like substance' on the canine tooth and a merely superficial iron-staining of the jaw, it is unwise for anyone to claim that a radiograph showing grains of sand in the pulp canal of the tooth is sufficient proof of antiquity. That some one should perpetrate such a hoax in Sussex is in itself a serious matter, but it is overshadowed by this blow to individuality. O men of Sussex, no longer will you lift up your hearts in Gumber, laugh the Weald, for chemistry has revealed that you are as other men.

Aspiring Chemists

ABOUT 4,000 students at technical colleges throughout the country are now registered with the Royal Institute of Chemistry as intending entrants for the A.R.I.C. examination. This seems a most gratifying total: present requirements of chemists are rated at 1,500 per year, and the annual number of passes which could reasonably be expected from these students would be an important proportion of that number. But although the number of passes has risen steadily during the past 20 to 30 years, the number of candidates has risen very much more rapidly and, say the Institute, 'the number of entries is now out of all proportion to the number of

passes.' Two principal reasons are suggested for this state of affairs. Many young men, apparently, register with the Institute without any real intention of taking the examination, but merely to extend their education and defer their call-up for National Service. This aspect of the matter cannot be changed by people in the chemical industry, except in their private capacities as members of local Education Committees, but the other reason put forward is very much their concern. Too many candidates, very likely intelligent and ambitious, are being urged by their employers to enter for the examinations before they are sufficiently advanced in their studies; discouraged by their failure at their first attempt, seized upon by the service authorities who will not extend their exemption, they very often have neither the desire nor the opportunity to enter again. This is a situation in which everybody loses; a little restraint on the part of the employers, not so much negative encouragement of the kind 'you can expect a good rise when you pass your exam.'—would result in more willing laboratory and process workers, more satisfied industrialists, and a higher number of passes in the A.R.I.C. examination.

CO_2 *as an 'Explosive'*

ONE of the more troublesome handling operations in the fertiliser industry has long been the loosening of set or caked piles of bulked superphosphate or compounds. Blasting with explosives has been a common solution. A new method both safer and neater has been developed in the United States. This utilises the force of expansion in gasifying carbon dioxide. Holes are drilled in the heaps from four to six feet deep; chrome-molybdenum steel tubes capable of withstanding very high pressures are inserted. One end of the tube has a discharge cap with ports through which the carbon dioxide can escape; the other end houses a charging cap with electrical terminals. The flow of current generates heat in the tube, and the compressed carbon dioxide reaches a pre-set pressure that disrupts a soft steel disc in the discharge cap. There is an almost instant release of expanding gas, which causes the fertiliser pile to loosen and, by proper placement of the tubes, to fall forward into the loading area. Demonstrations this autumn showed that the most noisy effect is no more than a dull thud; quite often no sound can be heard outside the building actually used. The tubes can be re-charged and re-used, moderately priced apparatus for this purpose being available.

Many Advantages

SOME of the advantages of the new method are obvious enough. Carbon dioxide is non-poisonous, and will neither burn nor promote burning. There is no risk that this type of 'explosion' can be severely expanded by a dust-laden atmosphere. Holes for the carbon dioxide tubes can be drilled much closer to walls, etc., than holes for inserted explosive charges. In the US fertiliser industry granulation is still in its very early phase and a much greater proportion of compounds than here must be passed through the curing-pile operation. However, much of our superphosphate is bulk-piled and stocks of muriate of potash held in bulk by mixing factories often cake with particular hardness. This CO_2-tube system should have useful potentiality in the British industry even though the granulation process has made heaps of compounds almost obsolete. Several accounts have been published, but the fullest so far seen was in *Chemical Engineering*, 1953, **60**, [9], 152-4.

Duty on Sulphuric Acid

By an order made by the Treasury with effect from 25 November, a 10 per cent *ad valorem* Customs duty has been reimposed on imports of sulphuric acid and oleum. Both sulphuric acid and oleum have been exempt from Customs duty since 24 May, 1951. The duty was removed at that time in order to stimulate supplies, owing to the severe shortage of sulphuric acid in this country, which was hampering industry. Monthly average production between January and August this year has been about 152,000 tons and consumption about 150,000 tons.

New BISRA Laboratories Opened

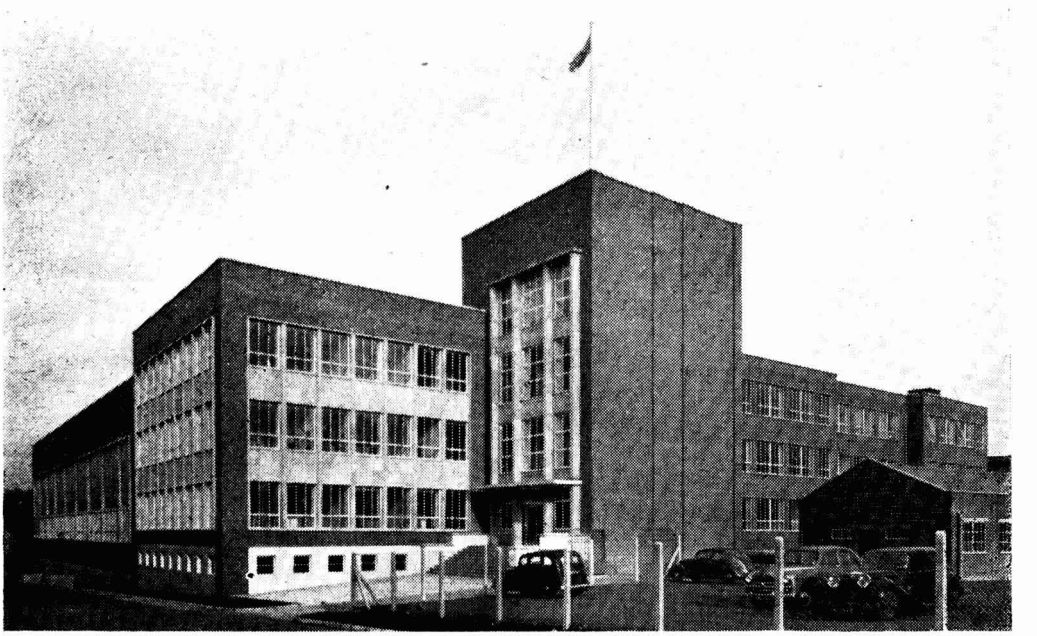
Chemical Problems in Iron & Steel Research

THE new BISRA laboratories at Hoyle Street, Sheffield, are among the finest research establishments of their kind in the world. Their opening on 19 November by HRH the Duke of Edinburgh represents an important landmark in the history of the British iron and steel industry.

Recognising that the future value of its huge development programme must depend largely on the extent to which the latest technical and scientific knowledge can be applied to every aspect of production, the industry has been expanding its research facilities at a very rapid rate. Each of the principal steelmakers has a well-founded research department of its own and the staffs of these departments have almost trebled since the war. Even greater is the expansion of co-operative research within the industry, which goes back for nearly 40 years. In 1945, BISRA was set up to gather together various research projects, which were being collectively sponsored by the industry, and to extend this work to other fields. Sheffield was chosen as an appropriate centre for the Association's work on the making, working and metallurgy of steel.

BISRA believe that the secret of successful industrial research lies in the early application of results. The establishment therefore contains much of the equipment of a steelworks, including pilot machinery for melting, drawing and forging, to try out the findings of research before they are applied to full-scale production plant. The provision of intermediate scale plant at the laboratories is regarded as an integral part of the iron and steel industry's great post-war development plans. Three new buildings have been erected, these being a main block of three storeys with a floor area totalling approximately 30,000 sq. ft., a metal working shop and a melting shop. There are also four older buildings which serve as a cutlery laboratory, a machine shop, a furnace model room, and an annexe. The cost has been of the order of £300,000 for the buildings and £200,000 for the equipment.

Research at the Sheffield Laboratories is organised within three Divisions concerned with steelmaking, metal working and metallurgy. The steelmaking laboratory is particularly concerned with the processes in the open hearth and electric furnaces and with the casting of ingots. The metal working laboratory studies the processes from the



ingot to the finished product. The metallurgy laboratory is concerned with the behaviour of steel and with special steels, and includes an analytical chemistry laboratory.

Productivity in steel making depends in the first place on how fast the cold raw materials can be melted, and secondly on how quickly they can be refined to give a product of the required composition. Fast refining calls for a low content of impurities in the refined metals and a high rate of reaction between the metal, slag and furnace atmosphere. Due to the raw materials available, British steel furnaces have to refine an iron with the highest sulphur and phosphorus content in the world. Phosphorus removal needs an oxidising condition, while sulphur removal prefers non-oxidising conditions. These difficulties result in a high slag burden and longer melting and refining times.

Agitation of Slag

The output of the steel furnace can be improved if some of the sulphur, silicon and phosphorus can be removed before the charge is introduced. Since the refining slag lies on a separate layer and above the metal, the speed of reaction depends largely on the degree of agitation. Owing to the high temperature, only the simplest means of agitation can be used and most of the common methods of chemical engineering are applicable. A study of the efficiency of various means of agitation is being made, using both simple model systems of two immiscible liquids containing a reagent, and actual metal and slag.

A cold 'model' slag/metal system is being used to investigate the agitation efficiency produced by various gas-blowing methods. Sodium amalgam and dilute sulphuric acid, representing slag and metal respectively, are placed in a beaker with a perforated 'Perspex' base. Nitrogen pressure is maintained sufficient to prevent the amalgam from running through the holes in the base. Samples of acid are taken to determine the rate of reaction under these quiescent conditions. Nitrogen is then blown into the system and sampling is carried out to determine the new reaction rate.

One way of intimately mixing iron and slag is to atomise the molten iron and drop the resultant globules through a molten desulphurising slag. Several methods have been used, one of them being to pour the molten iron from a convenient height on to a flat graphite plate, a collander crucible being interposed to break up the metal stream into globules. The metal may be atomised by means of a stream of nitrogen blown at high pressure through a carbon tube sited slightly above a hole in the bottom of the crucible. In all cases the recipient slag is quenched in water and the solidified metal is crushed. The metal globules are sized and the sulphur contents of the various size ranges are determined. In all BISRA's experiments a maximum removal of sulphur has occurred with metal droplets of relatively large size. Exploration of this promising field is being continued.

The most practicable way of releasing the sulphur content of iron before it is charged to the steel making furnace is to use sodium carbonate. The iron is tapped from the blast furnace into a ladle 'velocity' containing the required amount of sodium carbonate powder. To avoid damaging the furnace refractories the resulting slag must be skimmed off the top of the ladle before pouring. BISRA have studied the efficiency of usage of sodium carbonate and the best means of separating the soda slag. The separation can be improved by using special ladles with internal partitions, but their additional cost and complexity are obstacles to their use in works. An alternative possibility is to 'foam' the soda slag so that its bulk is increased and the weight of soda remaining in unskimmed slag is less. The search for an effective and cheap foaming agent is still in progress.

Sampling of Molten Metal

For sampling metal at different depths, BISRA have developed a probe consisting of a graphite tube closed at one end. Nitrogen is blown through a hole in the side as the probe is lowered into the metal. When the required depth is reached the gas flow is turned off, allowing metal to run in and form a pencil shaped sample. The probe may be lengthened by means of graphite extensions. It has been used in connection with soda and desulphurisation to determine how long it is necessary to stand the metal for complete slag separation.

Process chemistry concerned with the mechanism and speed of steelmaking reactions demands a considerable amount of chemical analysis of iron, steel, slags and gases. For example, the presence of hydro-

gen affects the mechanical properties of steel, and possibly the ageing characteristics. Efficient and convenient methods of determining hydrogen content are therefore required.

An apparatus for the vacuum fusion of gases, manufactured by W. Edwards & Co., Ltd., is designed to overcome some of the limitations experienced by earlier users of the vacuum fusion method. A solid sample is introduced into a graphite crucible in an evacuated system at an elevated temperature of the order of 1,700° at 10^{-6} mm. Hg. Under these conditions the oxides are reduced by carbon to carbon monoxide, the nitrides dissociate, and hydrogen is also liberated. Heating of the crucible and specimen is carried out by high-frequency induction, using a Phillips high-frequency generator, type F13/1, having an output of 6 kW at a frequency of 350 kc/s.

Since the reduction of oxides by carbon is an equilibrium type of reaction, it is necessary to remove the products of reaction rapidly to ensure completion of the reaction. For this purpose a high-speed mercury vapour diffusion pump is employed. If its efficiency is not to be impeded by the pressure of gases collecting on the backing side, it must be capable of operating against high backing pressures. The unit employed is a four-stage pump, which is capable of pumping at a rate of 75 litres/sec. against high backing pressures, with only moderate heater input. The gases are collected in a Toepler pump, whence they are transferred to a suitable gas analysis apparatus. The dead space to Toepler pump ratio is greater than 10: 1.

The specimen is introduced through a greaseless vacuum lock on the left of the metal header. Thus it is introduced into a readily pumped vacuum system and is not stored under vacuum conditions for lengthy periods before analysis. Pyrometer readings can be taken through an optically polished silica disc in the top of the metal header.

Analytical Laboratory

The analytical laboratory is equipped with a GLC volume gas analysis apparatus. A sample of gas is introduced and the gas pressure is read off from the right hand side of the burette. The gas is contained between one of several graduations in the left hand arm of the burette and the index mark. The percentage of CO_2, O_2 and unsaturated hydrocarbons may be separately estimated by passing the gas over the requisite reagent contained in the absorption chamber, after which the gas is brought back to the original constant volume control mark. The new gas pressure is then read off, the drop in pressure being a measure of the percentage of the particular constituent being determined. CO and H_2 are estimated by combustion over copper oxide.

Sleigh Gas Analysis Apparatus

A Sleigh gas analysis apparatus, which is portable, has a burette capacity of 9 ml. There are two bulbs each of 3 ml. capacity and a second limb of 3 ml. subdivided in 0.01 ml., which makes it possible to read any value from zero to 9 ml. The sample of gas is drawn into the burette via the absorption pipette and the latter is used for all absorptions and explosions. Before taking volume readings the levels of the dilute sulphuric manometer are brought to the same height. Since the manometer is connected to the measuring burettes and to the temperature and pressure correction vessel, small variations in them do not affect the accuracy of the analogues.

Pipettes of the Orsat-Lomechekov design, for use on the standard Orsat apparatus are employed by BISRA. Besides their robust and compact construction, an advantage is that a very large surface area of absorbent is presented to the gas and the required absorption time is therefore very short.

Great importance is attached to spectrographic methods for the analysis of iron and steel. The Spectrographic Analysis Sub-Committee of BISRA have studied the techniques used in various laboratories and their report has been published as a book, 'Spectrographic Analysis of Low-Alloy Steels.' The Sub-Committee have drawn up a recommended method suitable for the analysis of low-alloy steels, and this method has been given extensive trials on a series of chemically analysed standards with very satisfactory results.

The samples are excited by a condensed spark discharge. Since the spectrum obtained from a low-alloy steel under these conditions is very complex, the instrument must produce considerable dispersion of the line images. For this a large quartz spectrograph of the Littrow type is used.

In the recommended method, the internal method of calibration is used. The method involves a comparison between the blackness

of the spectral line of the element which is being analysed and that of a line of another element, such as iron, present in known amount on the same exposure. It depends for its success on the fact that the intensities of some iron lines relative to each other remain constant under various conditions of excitation. The comparison can be made with a non-recording densitometer. The BISRA method of spectrographic analysis applies to low-alloy steels with an iron content of ± 1 per cent. For compositions outside this range a correction is necessary.

Spectrographic analysis could be more widely used in the iron and steel industry if one disadvantage were overcome. Because it is a comparatively new method, and has been built up very largely by individual works for operation in their own particular circumstances, it is not reproducible between various works or laboratories. This lack of reproducibility is partly due to the use of different source units, since most laboratories have built their own units. BISRA's experiments, by making possible more complete control of the arc, may lead to greater uniformity of practice throughout the industry, with consequent widening of the usefulness of the method.

Besides housing the greater part of the Association's facilities for steelmaking, mechanical working and metallurgy, BISRA's new establishment also accommodates, independently but in close co-operation, the laboratory of the Cutlery Research Council. Provision has been made in the main block for administrative offices, a conference room, a library and a canteen. This block has been so built that it can be extended at either end with the minimum cost and disturbance to current use, while the steelwork and foundations permit the addition of another storey to the building.

Tribute to Gas Industry

Sir Ben Lockspeiser & Smog

SMOG and coal waste are two sides of the same medal, said Sir Ben Lockspeiser, secretary of the Department of Scientific & Industrial Research, when speaking at a luncheon held in London in connection with the Autumn Research Meeting of the Institution of Gas Engineers. In relation to this, he continued, the gas industry had a very good record. Only modesty prevented them from depicting Mr. Therm floating above the fog wearing a large size halo.

In the course of further remarks, Sir Ben said: 'The industry contributes virtually nothing to the annual output of some 2,500,000 tons of smoke and grit. As far as one can estimate, only 2 per cent of the 5,000,000 tons of sulphur dioxide put into the atmosphere annually comes from the gasworks, not more than 6 per cent from coke, and virtually nothing from the use of gas. If smokeless zones become fashionable, the gas industry, for one, will have a big part to play.

'You may have anxieties about getting sufficient suitable raw material. They are with you now, for in relation to our reserves, we are already producing a disproportionate amount of caking coal. Another factor in our own coal supplies is that with the increase in mechanical methods of production the proportion of small coal is steadily increasing. Your scientists and technologists are, I know, working on the problem of using fines and ungraded coals for gas making, and there are good grounds for believing that the extremely important problem of using coal, in size or quality, hitherto considered to be of little value in gas making, will in one way or another be brought to a successful practical conclusion.

'The study of this problem is by no means confined to the research laboratory. A pilot plant using low-grade gas making coal, by a process in commercial operation on the Continent, is to be erected by the North Thames Gas Board. In addition, the Lurgi pressure process, using oxygen, established for the gasification of brown coal, has now, I believe, been tested for bituminous coal, including British varieties, from 1 in. downwards. I imagine that both these processes are capable of further development and improvement, but they are, nevertheless, sound contributions to the technology of using non-caking coals for gas making.'

Holland Can Make ^{235}U

At the opening of the new Amsterdam laboratory for mass spectrography recently, the director, Dr. J. Kistemaker, announced that ^{235}U could now be produced in Holland. He added that big orders for ^{235}U isotopes had already been received from both Dutch and foreign customers.

Phosphoric Acid by the Wet Process*

by P. FLEURY†

THE manufacture of phosphoric acid by the dry process has not been generally adopted in European countries owing to the excessive price of electric power. Although the wet process constitutes, in fact, a waste of sulphuric acid, it is this process which is almost exclusively adopted by the manufacturers of phosphatic fertilisers.

In addition to the above mentioned disadvantage in connection with the wet process, there are two further drawbacks to be considered:

(1) It produces a very impure acid containing iron salts, calcium salts, sulphuric acid and fluorine containing compounds; with the exception of special cases, however, such as the manufacture of di-ammonium phosphate, these impurities do not constitute a great disadvantage for ordinary usages.

(2) It provides only relatively diluted liquors which have to be concentrated by evaporation. This, in addition to fuel costs, gives rise to problems of corrosion and furring, which are sometimes difficult to solve.

Experimental Process

Experiments carried out from 1937 to 1943, at first in the laboratory and subsequently on a semi-industrial scale, have enabled us to work out a process based on gypsum which produces, from North African phosphates and 75 per cent sulphuric acid, a phosphoric acid with a density of 1.40 containing about 32 per cent of P_2O_5. An adequate filtration speed is achieved by crystallisation of the sulphate of lime in a satisfactory form.

In describing this small installation it is not our intention to represent it as a technical innovation. We were of the opinion, however, that it was of interest to demonstrate the principle of an experimental plant much favoured in the United States but less in evidence in Europe.

The process adopted is discontinuous and is characterised by a series of single and independent operations. This procedure obviously gives a smaller output than a continuous process but it simplifies the apparatus and, above all, it enables the manufacturer to observe at once the effect of any variation in the operating conditions.

The ground phosphate rock is attacked by phosphoric acid of a fairly high concentration, from previous operations, containing 25 to 28 per cent P_2O_5 by weight, of density about 1.30, and at a temperature of 85°.

It is possible to carry out the attack at a slightly higher temperature without modifying the crystalline form especially if precipitation of calcium sulphate takes place at a temperature and concentration which corresponds to a point shown on the curve of separation of the zones gypsum/semi-hydrate. As a matter of fact, it is possible to assume that at the moment of introduction of sulphuric acid to the magma, the solubilisation of the P_2O_5 of the phosphate is not instantaneous but progressive. The concentration of the P_2O_5 therefore does not attain its maximum and a rise in the temperature at that moment has no disadvantage, but on the contrary, permits of a more rapid reaction and a more complete attack.

With a given initial concentration and temperature, the crystal size of calcium sulphate, and consequently the speed of filtration and the facility of washing, depends in particular on the volume of recycled phosphoric acid, i.e., on the quantity of water in the presence of which calcium sulphate is precipitated.

If 2,500 litres of phosphoric acid are recycled per ton of phosphate, which corresponds (at a concentration of 26 per cent) to approximately 1.5 times the quantity of P_2O_5 contained in the phosphate, large crystals are obtained which are readily filtered and washed. The recycling of the sludge from a preceding operation in place of the filtered acid does not seem to us advantageous as compared with our mode of operation.

In a batch process it is a question of time-saving in order to reduce the time of attack to a minimum, retaining at the same time a satisfactory rate of extraction of P_2O_5. For this reason and on account of the small dimensions of the apparatus, which causes increased heat losses, and also on account of

* Condensed from a paper read to the International Superphosphate Manufacturers' Association in Cambridge, 15 & 17 September.

† Union Francais d'Engrais et de Produits Chimiques.

the comparatively low concentration of the sulphuric acid used we have been induced to heat the vessel used for the attack in order to maintain the temperature at 85°. Under these conditions the complete time of attack did not exceed 1.15 hours.

The phosphate is introduced into the phosphoric acid raised to a temperature of 60° and submitted to vigorous agitation for approximately 15 minutes, after which sulphuric acid is added rapidly at room temperature. The temperature rises rapidly to 85-90° which is maintained by heating, and agitation is decreased at the same time in order to assist the formation of crystals. After an hour the magma is ready for filtering, 98 per cent of the P_2O_5 having been solubilised.

Special Features

The installation is characterised by two special features, the remainder being built on the usual lines.

(1) Both filtration and washing is carried out in a continuous centrifugal drier with a horizontal axis and automatic extraction of the cake.

(2) Washing is carried out with liquids the concentration of which is progressively and continuously decreasing thanks to an appropriate device.

The dimensions of the apparatus have been determined by the size of the drier. The largest model available at that time requires a tank two metres in diameter with a capacity of 1,100 litres. As each batch has to be filtered in one operation the quantity of the treated phosphate per batch may not exceed 400 kg.

The plant was housed in an existing concrete building arranged on a metal framework on the principle of gravitational flow. At the top at a distance of 10.50 metres from the floor is a hopper for ground phosphate coming from the grinding plant; the maximum fineness of Morocco phosphate (Kouribgha) corresponds to a residue of 10 per cent on sieve No. 150.

Below is an automatic weigher and a volumetric gauge for the sulphuric acid from a lead chamber plant. This acid with a density of 1.65 contains 75 per cent H_2SO_4. On the same floor are tanks for the recycled phosphoric acid (provided with coils for reheating and cooling) tanks for weak washing acid and a water-heater for the final washing.

Further below is the mixer. It is a 'Dietrich' apparatus of 2,000 litres capacity, the hemispherical bottom of which is double-walled thereby permitting heating with steam at low pressure. The tank for breaking down the phosphate is of steel lined with lead. The agitator with variable speed is of 18/8 stainless steel containing molybdenum. The paddles as well as the baffles fixed to the cover form an anti-froth device. The generated gases are drawn off through steel pipes lined with ebonite and carried to the washing installation of the superphosphate plant. The apparatus is emptied through the bottom, lead piping conveying the sludge to the drier placed on the lower floor.

The drier is a 'Robatel' apparatus of the two-metre-type with a very large blade for scraping. The vessel turns at 500 rev. a minute, the centrifugal force developed at the perimeter corresponding to 270 G. It is equipped with a 2 mm. stainless steel gauze on which is placed a 'Thermovyl' filter cloth. The drier is mounted on springs on a concrete bed of 40 tons, which in turn rests on six pillars 2 metres in height. Thanks to these devices, an accidental unbalance of the vessel caused, for example, by an irregular charge, may produce oscillations of the machine of several millimeters' magnitude without causing any dangerous strain and without transmitting any vibration to the floor.

Washing Procedure

For washing, instead of following the usual procedure of successive washings with dilute acids, followed by water, it has been observed that if the solutions enter a vessel slowly and at an appropriate point, no appreciable mixing takes place and thus it is possible to superimpose progressively diluted acids and to surmount them by a layer of water. Diffusion is very slow and does not take place in the course of manufacture.

Since this plant is purely experimental no endeavour has been made to attain an intensive production. However, periods of regular operations have made it possible to carry out a series of operations each of which lasted about 1.15 hours, both filtration and drying not exceeding 45 minutes. The drier would have been capable of dealing with a production of approximately 2.5 tons of P_2O_5 per 24 hours.

Latest News of German Chemical Industry

Natural Gas to be Used as Chemical Raw Material

CAPITAL requirements for replacement of worn-out and obsolete plant in the West German chemical industry amount to £60,000,000-£70,000,000 a year, according to W. A. Menne, president of the German Association of Chemical Industry, and an additional £40,000,000-£50,000,000 will be needed to provide new plant for new productions, he said at a Day of Chemistry celebration at Baden-Baden in the presence of Chancellor Dr. Adenauer. At present 20-30 per cent of the output of leading chemical manufacturers in Germany consists of products not made five years ago, he stated, and an increasing rate of new investment will be required to maintain Germany's position in the world market.

From the speech and a policy memorandum issued by the Association it appears that the German chemical industry does not favour pooling of West European chemical resources on the lines of the Coal and Steel Union. This would be a 'retrograde step,' in the German view, likely to encourage self-sufficiency tendencies. What is said to be needed is 'honest competition without open or camouflaged export subsidies' combined with 'a direct understanding among producers in specific fields,' apparently through international cartel arrangements without Government participation.

Natural gas will be used as a raw material by one of Germany's foremost chemical producers, Farbwerke Hoechst AG, under a long-term contract with Deutsche Erdöl AG which allows the former company to draw freely on the latter's production of high-grade methane gas at Pfungstadt, Hesse. A pipeline will shortly be laid between Pfungstadt and Höchst. Methane has been produced from coke-oven gas at Höchst for many years past, but all or a substantial part of this source is now to be superseded by the Pfungstadt well.

'Terylene' Rights Acquired

Farbwerke Höchst AG, acting in conjunction with Vereinigte Granzstoffabriken AG, has acquired the rights for the exclusive production of Terylene in Germany (THE CHEMICAL AGE, 24 October, p. 860). The starting materials will be obtained from Imhausen-Werke GmbH, Witten-Ruhr. The two German firms have done considerable work in the synthetic fibre field and are reported to have already started on the preparations for producing the polyester fibre.

Sodium chlorate, which before the war was produced in large tonnages at Bitterfeld, in the Soviet occupation zone, is now being made in West Germany. Electro-Nitrum AG opened a new plant at Laufenburgh, Baden, early this year and is now producing the material, chiefly for the Federal Railways, at the capacity rate of 1,500 tons a year—which is little more than one-quarter of the total demand. Substantial tonnages are still being imported from the Soviet zone and from France. Plans for the erection of a second plant with public money at Rappenau, Wurtemberg, have been abandoned in view of the price fall which has taken place during the past two years.

Underground Flotation Plant

An underground flotation plant has been put in commission at the Riedel works of Burback-Kaliwerke AG, and the production of high-grade potassium chloride started here a few weeks ago. Burbach and other West German potash producers are paying special attention to the production of compound fertilisers as a means of securing additional outlets for their growing production. New fully mechanised mining methods are to be introduced in two Burbach mines to save labour, reduce costs and exclude the dangers inherent in the use of explosives.

The foreign sales of the West German potash industry have taken a more favourable course during recent months than had been expected, largely as a result of transport difficulties in the Soviet occupation zone which prevented the East German potash industry from carrying out its export contracts. Production in the quiet summer months was fully up to the 1952 average production, and it is expected now that total figures for the current year will show a substantial increase in output and deliveries over last year.

The West German potash industry also profited from strikes in the French potash

mines this year and the high cost of potash production in France which French potash producers attribute to the heavy financial burden resulting from the employment of loan capital. In view of the grant of an export subsidy to French potash producers by the Government with effect from 1 November this year, West German potash producers anticipate that their relative share in the world market will decline, but they hope to make up for this by an expansion of world potash consumption resulting from increased publicity and extension of the foreign sales organisation.

A compensation deal has been concluded with INACO in Santiago under which West Germany will import 10,000 tons of Chilean sulphur in exchange for German manufactured goods of secondary importance. West German sulphuric acid production was last reported at a monthly rate of 125,000 tons of SO_3.

Bauxite in Bigger Demand

Aluminium Industry Expansion

LARGE-SCALE expansion of bauxite mining and processing facilities was proceeding during 1952 in the West Indies, the Guianas, West Africa and South-central Europe, according to a survey just issued by the Bureau of Mines, United States Department of the Interior.

The demand which led to the new developments, states the survey, resulted from a phenomenal expansion of the aluminium industry, particularly in the US, Canada, Germany, and the USSR. Although the US had been neither an international supplier of bauxite nor a self-sufficient nation in aluminium ore in recent years, it continued to have all the alumina production capacity it required. All four of the alumina plants operated since the war were expanded under the aluminium expansion programme. One new alumina plant began production in 1952, and a sixth plant was under construction.

Salient statistics of the bauxite industry in the US during 1952 are given in long tons as follows:—Crude ore production (dry equivalent), 1,667,047 (compared with 1,148,792 in 1949); imports (as shipped), 3,497,939 (2,688,164); exports (as shipped), 41,330 (34,902); consumption, 4,240,891 (2,677,733). World production in 1952 is given as 12,634,000 long tons, which compares with 8,344,000 in 1949.

Despite the reduced mine output, shipments of crude and processed bauxite to consumers increased 31 per cent (24 per cent on a dry-equivalent basis). The quantity of crude ore that was dried, calcined, or activated before shipment to consuming plants was only slightly more than half that of 1951.

The increased bauxite consumption of 4,240,891 long tons brought it up to an annual level surpassed only by the peak war years of 1943. Most of the increase resulted from a greater demand for alumina to meet requirements of the expanding aluminium industry. Production of primary aluminium rose 12 per cent from 1951 to 1952, despite a severe cutback in the power available for reducing alumina to metal.

The US consumption of bauxite in 1952, by industries, was as follows (dried—bauxite equivalent—long tons): Alumina, 3,721,629 (compared with 3,364,923 in 1951); abrasive, 254,815 (304,436); chemical, 157,789 (169,522); refractory, 53,379 (48,573); others, 53,279 (53,749).

The five alumina plants of the aluminium producers had a total output of 1,863,000 short tons of calcined alumina and 123,000 tons of alumina in other forms in 1952. It was calculated that an average of 1.91 long tons (dry basis) of bauxite was required to yield one short ton of calcined alumina. An average of 3.65 long tons of bauxite was used to produce one short ton of aluminium.

Although bauxite was the principal raw material source of aluminium for the aluminium salts production shown in the table below, clay, alumina, aluminium, and alunite were also used. The overall production of aluminium salts declined 8 per cent from 1951 to 1952, reflecting a lower demand for commercial-grade aluminium sulphate, iron-free aluminium sulphate, and anhydrous aluminium chloride.

PRODUCTION OF SELECTED ALUMINIUM SALTS IN THE U.S.A., 1952

Type of Salt	Production (short tons)
Aluminium sulphate :	
Ammonium	5,823
Potassium / Sodium	17,296
General :	
Commercial	673,420
Municipal	15,501
Iron-free	38,236
Sodium aluminate	11,390
Aluminium chloride :	
Liquid	12,704
Crystal / Anhydrous	25,482
Total	799,852

Indian Newsletter

FROM OUR OWN CORRESPONDENT

THE Government of India have decided to invite tenders for establishing a urea plant and an ammonium nitrate plant, both to be located at Sindri. The Indian Fertiliser Mission which went into the question considered the manufacture of these two chemicals as 'technically feasible.' It recommended that for a urea plant, until more experience and knowledge is gained, the plant should be of the smallest type consistent with economic production. Hence it was decided that estimates of capital expenditure and production cost should be called for two plants one capable of producing about 30-35 tons of urea per day and the other about 60-70 tons per day.

The Mission's report said that, 'if estimates reveal that production cost for the lower would not be appreciably larger than that for the higher capacity plant and, on a nitrogen basis, be no higher than the cost of production of ammonium sulphate at Sindri, a single reactor plant with a capacity of not more than 35 tons per day should be installed; failing this the installation of a plant with two reactors with an average production of 60-70 tons per day is recommended, though with some hesitation.'

With regard to ammonium nitrate the mission recommended the manufacture of a compound fertiliser like chalk-ammonia saltpetre as is the European practice. From the point of view of balanced production, a plant making 150 tons of 53 per cent nitric acid per day and capable of producing 110-115 tons of ammonium nitrate or 180 tons of compound fertiliser per day was considered the minimum size for an economic unit. It was decided to invite quotations for a plant producing 130 tons and another for 250 tons per day of compound fertiliser and to finalise decision on the size of the plant after receiving the estimates of production costs.

* * *

The Development Council for Heavy Chemicals (Acids and Fertilisers) of the Government of India met and considered the possibility of establishing the manufacture of barium salts in India. In view of the abundance of raw materials and the potential demand for barium salts, it recommended to encourage their manufacture. The Council also recommended the establishment of a National Fertiliser Association to develop and to devise ways and means for popularising the use of fertilisers in India.

* * *

The Ministry of Production, Government of India, has sought the approval of the Planning Commission for its scheme to set up a synthetic petrol plant. It may be recalled that the Government of India considered this as far back as 1948 but dropped the idea owing to the large outlay involved. The US firm of Koppers Inc. who originally recommended a plant for manufacturing 150,000 tons of petroleum products using 1,700,000 tons of non-coking coal per year from the Damodar Valley area later modified the project to produce aviation spirit, motor fuels and refined petrols simultaneously. The German firm of Lurgi Gesselschaft have also submitted a scheme for production of synthetic petrol by a modified Fischer-Tropsch process.

* * *

According to the Geological Survey of India which has just concluded an investigation, about 50,000 tons of manganese ore is available in the interior of North Kanara District of Bombay State, as pockets, lenticles and boulders of various sizes. Owing to the inaccessibility of the region only hand picked specimens are now worked for export; however, it is suggested that a larger tonnage of high grade ore may be available if beneficiation is carried out. In this connection, attention must be drawn to the recent restrictions on exports of manganese ore from Madras and Calcutta ports, imposed by the Government. Trade circles have pointed out that, while the reserves of manganese ore in the country were once believed to be about 25,000,000 tons, they are now placed at 60,000,000 tons. The sustained demand for manganese ore from the Continent and Japan and the easing of the transport bottleneck, they said, call for free export of the ore which will provide greater employment and earn much needed foreign exchange.

The Mineral Advisory Board of the Ministry of Natural Resources and Scientific Research of the Government constituted three sub-committees to examine in detail the question of royalties and dead rents in the major mineral mining industries in India. Royalties and Dead Rents prescribed in the Mineral Concessions Rules, 1949, vary for the various minerals and divergent views prevail between the Government and the industry as to the existing rates. The task of the committees will be to rationalise the rates and place them on a sound footing. The committees consist of a representative of the Government and of the industry, and have been asked to submit their reports before the close of the year. The three committees deal with the following minerals: (1) Iron ore, chromite, limestone and coal; (2) manganese ore, mica and china clay; and (3) gold, copper, lead, zinc and kyanite.

* * *

Ceylon has entered the monazite market with the first shipment of 30 tons of monazite sands to the US at £125 per ton. (The export of monazite from India is banned by the Government.) The Government of Ceylon deal exclusively with the valuable mineral and there is no stipulation on export or on destination. It is estimated that about 1,500 tons per annum will be available for export. It is learnt that buying is keen and already a Dutch firm has offered £200 per ton of monazite.

Winchester Bottles

IN 1939 the BSI issued a standard for Winchester bottles at the request of the Association of British Chemical Manufacturers and the British Chemical Plant Manufacturers' Association. Because of the wartime difficulties of supply the standard was not widely used and a revision has now been prepared which is consistent with current practice. The new standard, BS. 830: 1953, 80 oz. and 90 oz. Winchester bottle, relates to plain and fluted containers, and in order to facilitate storage and outer packaging the same maximum diameter has been adopted for both types in each capacity. Alternative types of neck finishes are provided. Copies of the standard (2s. net) are obtainable from BSI, Sales Branch, 2 Park Street, London, W.1.

USA Lead Industry in 1952

Transition from Scarcity to Plenty

THE outstanding feature of the United States of America lead industry in 1952 was the complete transition from scarcity to plenty. A survey just issued by the Bureau of Mines, US Department of the Interior, gives the total supply figure as 1,477,000 tons.

This total compares with 1,155,000 tons in 1951 and was made up as follows:—

Mine production of recoverable lead 390,000 tons; secondary lead recovered, 471,000 tons; and imports (exclusive of scrap), 616,000 tons. Imports, more than double the previous year, established a new record and were the determining factor in the supply position change. The great influx of foreign lead resulted from expanded free-world production and price drops in foreign markets which stimulated shipments to the US.

Removal of Controls

As a consequence of the increased availability of lead, the domestic selling price declined from 19 cents per lb. to a low of 13.5 cents, and the National Production Authority revoked all controls on lead in May. Reduced consumption—1,131,000 tons in 1952 compared with 1,185,000 tons in 1951—also contributed to the abundance of lead in 1952.

Domestic mine production of recoverable lead increased slightly to 390,000 tons. Gains were made in the first half of the year when high prices stimulated production; during the latter half of the year, when total prices were depressed, production was at a rate 4 per cent below the 1951 rate. Missouri was by far the leading producing state, accounting for 33 per cent of the total US output. Idaho and Utah were second and third in production, with 19 per cent and 13 per cent, respectively, of the total. Production in seven of the 16 principal states was higher than in 1951.

A number of lead-zinc mines shut down during the latter half of the year and many others operated at reduced rates because of depressed metal prices. Labour strikes and shortages in power contributed to the decrease in lead production.

Polyacrylate Copolymers

Recent Improvements in their Mechanical Properties

METHYL methacrylate polymers have found many applications in everyday life, and under the name of 'Perspex' are known to most people. The heat sensitivity of the polymers and copolymers, however, if surmounted, would substantially add further uses for these plastic materials. Such a defect precludes the application of these derivatives in the manufacture of certain food utensils and medical equipment which must undergo sterilisation.

Recently, however, improved heat-stable copolymers containing polymethyl-methacrylate moities have been prepared by cross-linking the plastic chain with ethylenic derivatives capable of exhibiting secondary valency characteristics, such derivatives containing carboxy, amide or hydroxy radicles. The cross linking in these cases functions through hydrogen bonding. By increasing the number of secondary valency unsaturates in the polymer, the rigidity is enhanced. The stable complexes between thiourea and the mercaptopyrimidines are stabilised by such bonding enhanced by protonic resonance.

Spectacle glasses possessing great hardness have been made from copolymers comprising methyl methacrylate esters, allyl methacrylates and methacrylic acid (BP. 698,193). Films possessing good pliability at low temperatures, coupled with a resistance to plastic flow have been prepared from polymers of ethylene, alkyl acrylates and alkyl maleates, where the plastic nature of the polyethylene lamina is combined with the rigidity of the polyalkylacrylate moiety (BP. 698,007). These polymers can be cured by such conventional agents as the thiuram tetrasulphides and the benzthiazyl disulphides, as well as the organic isocyanates.

Molecular Ratios

The molecular ratios of the monomers vary from 0.25 : 1 to 8 : 1 for ethylene/alkyl acrylate mole ratios and from 0.02 : 1 to 0.5 : 1 for maleic acid/alkylacrylate ratios, the plasticity of the film being related to the ethylene/polar resin mole ratios. These systems are successfully polymerised using such free radical catalysts as $\alpha\alpha'$-azodi-*iso*-butyronitrile.

In the production of films of exceptional strength curing is effected by sodium metasilicate or *pp'*-methylene diphenylisocyanate. The cross-linking effected by the latter is possibly based on the bifunctional nature of the organic isocyanate. The Claisen reaction at the methylene and the formation of carbamido linkages by the intermolecular reaction of the isocyanate group with the neighbouring carbethoxy group of the plastic chain possibly contributes to the establishment of the links.

$$:CH.COOEt + Ph.CH_2.Ph.NCO + HOOC.CH: \rightarrow :CH.CO.CH(Ph).Ph\,NH.CO.CH:$$

The cross linking effected by sodium metasilicate, on the other hand, may involve a Claisen condensation with the elimination of EtOH, the condensation being effected at the α-carbon and the neighbouring carbalkoxy groups as observed in the polymerisation of the polyethylacrylates.

Polyethylacrylates are polymers of interest because they may be processed in much the same way as rubber. The thermoplastic disadvantages of these polymers may be overcome by specific curing techniques. Due to the saturated nature of the plastic chain, conventional curing agents such as thiuram and benzthiazyl sulphides are not suitable for the conversion from the plastic to the elastomer state.

Substances capable of effecting hydrolysis or condensation such as KOH or sodium metasilicate are used in these curing operations. During the curing operation EtOH is liberated, which may suggest that (1) the ethanol is liberated as a result of condensation, or (2) the curing agent acts as a hydrolytic agent, culminating in hydrogen bonding by the free polar groups. (1) is supported by the failure of polyethylmethacrylate to cure, using such curing agents, while on the other hand, (2) is supported by the X-ray diffraction patterns for analogous structures such as α-carboxypimelic acid, where the hydrogen bonding in the system presents a three dimensional structure, which is destroyed by the introduction of alkyl groups to give a liquid configuration as observed in the polyacrylates.

Chemical Engineers

More 'Desperately Needed' in Industry

FIVE times as many chemical engineers are needed in industry today as our universities are producing, according to Professor M. B. Donald, Ramsay Professor of Chemical Engineering at the University of London, when speaking at a meeting organised by the Institution of Chemical Engineers at Caxton Hall, London, last week.

The meeting, which was briefly referred to in THE CHEMICAL AGE last week (p. 1085), was attended by nearly 200 schoolboys and careers and science masters from London grammar and public schools.

Exceptional Development

Opening the meeting, Mr. S. Robson, president of the Institution, said no other industry had shown so great a development and expansion as the chemical industry, but it was dependent on an adequate supply of chemical engineers.

Professor Donald said there was a great shortage of students going to university to study chemical engineering. The position was very difficult, and the Institution had felt that it should try to get both masters and pupils interested in the hope that they might increase the flow of boys into chemical engineering.

Most of the future lay in the field of technical developments, yet at this time when more and more technicians were so badly needed, it was disturbing to find that nearly 1,000 science masters had left the schools during the last 10 years.

Chemical engineers were needed not only in the petroleum refining industry, but also for work in the fields of plastics, alkalis, pharmaceutics and atomic energy. The chemical engineering course equipped the student to enter any one of these fields.

Professor H. F. Garner, of Birmingham University, said the trouble lay in the fact that there were too few schools of chemical engineering attached to the universities.

More and more American process licences were having to be used in this country, and the position was getting worse and worse. They had to buy licences connected with oil refining not only for the petroleum industry but also for similar processes in other fields, such as, for example, the manufacture of penicillin solvent extract.

The desperate need of industry for chemical engineers was also stressed by Sir Arthur Smout, chairman of Murex Ltd., when, at Birmingham last week, he launched an appeal for an additional annual income of £75,000 for Birmingham University for the next seven years. He is chairman of the appeal committee.

Without additional income, said Sir Arthur, the enterprise, and to some extent the independence, of the University in the field of chemical engineering would be thwarted.

The costs of materials for the chemistry and physical departments, staff wages and so forth, had risen in the past two or three years by £30,000, none of which was covered by Government grant. Budgets had consistently been cut, but nevertheless had been overstepped and if industry and the community generally were to gain from important projects now going forward it was vital to increase the income.

Anti-Freeze in Canada

MOTORISTS in Canada are now buying a widely advertised type of permanent anti-freeze mixture for a dollar a gallon less than they paid a year ago. Formerly sold at $5.95 a gallon, the anti-freeze is now being retailed at $4.95 and in some cases, $4.75 a gallon. Less well-known brands can be obtained for $3.98 a gallon.

The price cut follows a year of investigation by the Canadian Tariff Board. In August, 1952, Finance Minister D. C. Abbott wrote to the Tariff Board stating that it appeared that the 'spread' between the price received by the manufacturer for ethylene glycol and the price paid by the consumer was 'rather substantial.' At that time, Canadian manufacturers of ethylene glycol were complaining that the fluid was being imported at less than the cost of production in Canada. The board found that the imported glycol was a mixture. The Dow Chemical Co. of Canada, one of the biggest manufacturers, claimed only pure ethylene glycol was entitled to duty free entry.

This view was upheld by the Tariff Board. The exporters stopped shipping mixtures and sent the pure liquid, making it available at the same price as that charged for the mixture. The Canadian manufacturers had to meet the competition.

In the Editor's Post . . .

Tariffs in North America

SIR,—The 19 September issue of your magazine carried two paragraphs on the subject of tariffs under the heading, 'Notes and Comments.' The first paragraph, titled 'Tariffs in North America,' states that, 'US tariffs are high, Canadian tariffs are low,' You then go on in the second paragraph, titled, 'Britain May Benefit,' to say, 'tariff rates in the US run between 25 and 50 per cent; in Canada they run from 5 to 20 per cent.'

We believe the figures you have used give an incorrect impression. Data published by the United States Government shows the following for the year 1952:—

	$ Value	*Per cent of Total*
Total imports into US	$10,700,000,000	100.0
Duty free imports ..	6,250,000,000	58.4
Imports dutiable at less than 20 per cent	3,440,000,000	32.1
Imports dutiable at above 40 per cent	107,000,000	1.0
Average duty on dutiable items ..	—	12.8

According to the US Department of Commerce, in 1951 duties collected on imports into the United States were only 5.6 per cent of the total import value. A separate study showed that in the same period, duties on imports into Canada were 7.4 per cent of the import value, while in the United Kingdom, duties collected were 25.6 per cent of the import value. As you so aptly state in your editorial, 'Tariff rates commonly bear considerable relation to a country's need. . . .' The foregoing figures should offer conclusive evidence that, on those products needed in the United States, our tariffs are a lot lower than is the case on products needed in either Canada or the United Kingdom.

As to imports of only chemicals and related products, and bringing in data on such goods imported here from Canada, the following figures should be of interest:—

	Imports	*Imports from Canada*
Total imports ..	$244,000,000	$77,000,000
Duty free imports ..	170,000,000	57,000,000
Dutiable imports ..	74,000,000	20,000,000
Duty collected* ..	10,600,000	26,000,000
Average duty on *dutiable* items ..	14.4%	13.3%

* No published data—calculated at most favoured nation rate on each commodity in group.

Regarding your statement about the spread of tariff rates in the United States being between 25 and 50 per cent, Schedule A of the Department of Commerce shows this spread of import duties on chemicals and related products:—

	No. of Commodities in Group 8	*No. of Group 8 Commodities Imported in 1952*
Duty free	101	70
Specific duty (cents per lb., gal., etc.) ..	187	121
Specific duty plus a percentage of value ..	86	71
Duty of—		
10 per cent of value and less	27	16
11 per cent to 25 per cent of value ..	86	77
25 per cent of value	6	5
30 per cent of value	5	5
35 per cent of value	8	2
40 per cent of value	1	—
45 per cent of value	4	3

These figures definitely establish the fact that United States tariffs are *not* high. Regarding your statement that 'Canadian tariffs are low,' may we remind you that many of Canada's low duty rates are qualified by the statement, 'of a kind not produced in Canada,' referring to the particular commodity. This bar makes a low tariff useless to many a potential exporter to Canada.—Yours very truly,

F. SCOTT GODRON.

Victor Chemical Works, Chicago, Illinois.

Selenium Recovery

SIR,—Referring to your recent articles on selenium I may inform you that I have been considering the same problem for some time. A short notice regarding the situation in Scandinavia may therefore perhaps be of interest to your readers, and I shall be glad to give more detailed information on demand.

'The various Norwegian pyrites contain different quantities of selenium depending on the content of copper. Generally speaking a high content of copper means a corresponding high content of selenium. The selenium content therefore indicates the various types of pyrites. For instance the content of selenium in pyrites with 0.28 per cent Cu is only 7 gm. per ton compared with 198 gm. per ton in pyrites containing 16.26 per cent Cu. (The price of 200 gm. selenium is today £2.)

'The chemical woodpulp industry in Scandinavia, using sulphur or pyrites containing selenium, separates the selenium from the SO_2 gases by passing them through wet Cottrells. The selenium separates in a native form as a red sludge, this sludge being refined by chemical extraction to 99-99.5 per cent selenium.' (*Det Kongelige Norske Videnskabers Selskab Forhandlinger* BD XIV, Nr10.)

Suggesting that the above may be of some interest to you, I am

Yours truly,

Oslo. R. KERLOR

Contractors' New Offices

W. J. Fraser & Co. Ltd., Harold Hill

THE address of W. J. Fraser & Co., Ltd., chemical engineering contractors, will be Harold Hill, Essex, as from 1 December.

The opening of the new head offices of the company marks a further stage in the steady development of this century-old firm. The business was founded before 1830 with works at Houndsditch, and shortly afterwards, in 1836, was removed to Commercial Road. In 1910 the main offices and works were established at Dagenham, beginning an association of Frasers with Dagenham which has lasted 43 years. During this time, and particularly in the period between the wars, development was extensive, and Frasers became well known, not only as experienced constructors of various specialised types of plant, but also as main contractors for the complete engineering of chemical and similar projects.

After the second world war it became urgently necessary to seek accommodation with facilities not only for greater output but also for the handling of larger vessels. Frasers therefore decided to move their main manufacturing operations to a much larger factory at Monk Bretton, near Barnsley, Yorkshire, and, in due course, to provide new premises in the Dagenham district for the extensive administrative, planning and drawing offices called for by their present world-wide activities. Hence Harold Hill.

This modern building, now in process of being occupied, has been planned to provide adequate headquarters and administrative offices. It also houses the purchasing and construction planning departments, as well as the entire technical staff, of chemical engineers and design and layout teams, needed for all the different work involved in the design and engineering of Frasers' large-scale chemical and allied projects in all parts of the world. In a further extension at Harold Hill planned for the near future, Frasers will re-establish their pilot plant and research departments, previously at Dagenham.

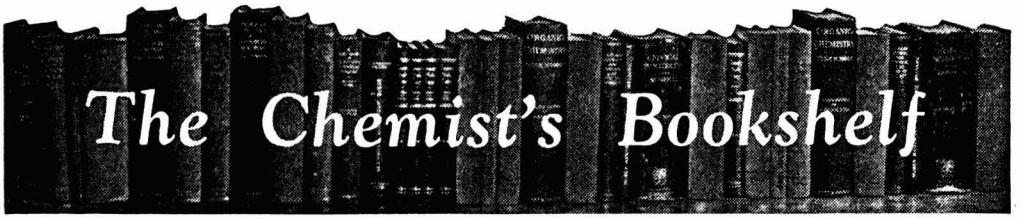
Meanwhile, the manufacturing end of the business is in full production at the Barnsley factory. With the present transfer of the main offices from Dagenham to near-by Harold Hill, the long association of Frasers with Dagenham thus comes to an end. In this connection it is appropriate to mention that the firm's employees from Dagenham and Romford are moving to Harold Hill. Employment at Barnsley was offered to all works employees at Dagenham and many accepted. The board has made generous provision for certain of the older works employees and others not able to accept.

New Use for Hydrazine

THE strong reducing action of hydrazine has recently been put to new use by a major hydrochloric acid manufacturer to remove free chlorine in making muriatic acid. The new method is said to offer advantages of both convenience and economy over conventional methods of additional scrubbing or use of usual antichlors.

Hydrazine in the form of hydrazine hydrate is added to the acid in the finished product storage tank or tank car in approximately stoichiometric proportion to the amount of free chlorine present. It combines with the chlorine to form hydrochloric acid and nitrogen. In the operation, chlorine-free acid is produced, and the amount of chlorine removed approximates 50 ppm.

Mathieson Chemical Corporation, supplier of the hydrazine, believes that the method will prove economical for removal of considerably higher concentrations of chlorine and also for the purification of aqueous solutions of other halogen acids. It appears probable that hydrazine will prove similarly useful in the purification of anhydrous halogen acids and other liquids and gases.



PLASTICS PROGRESS 1953. Edited by P. Morgan. Iliffe & Sons Ltd., London. 1953. Pp. 439. 50s.

As on the previous occasion in 1951, this book contains a record of the papers read and the ensuing discussions occurring at the Plastics Convention.

Although many aspects of the plastics industry are reflected in the present collection of papers, the coverage appears restricted when compared with that in 1951. In general, the accent is on the technology rather than the chemistry of high polymers, and even the paper by Staudinger, which examines the heat stability of polyvinylchloride, is devoted to the solution of a technological problem.

A substantial part of the text dealing with the production rather than the fabrication and selling of plastic materials is devoted to the subject of reinforcement by inert fibres such as glass and asbestos.

In these reviews the discussion seemed to be confined to the more familiar resins such as phenol-formaldehyde and polyester, with the consequent neglect of other possible types such as the furfuryl alcohol-furfuraldehyde resins. Being less of a speculative nature and more concerned with the fabrication, the papers in this section are not of immediate interest to the theoretical chemist. However, because of the high chemical resistance of many of these materials, the chemical engineer is directly interested in the construction of items of chemical plant from them. In some cases the availability of such combinations as polyester-glass cloth, and phenol-formaldehyde-asbestos felts has given a new flexibility to plant construction since many complex shapes may be fabricated on the site with quite simple equipment. A very complete account of the physical properties, price and source of these materials is given and this provides a useful guide for the potential user.

Two of the newer additions to the range of plastics commercially available in this country are described in two separate papers. The chemistry of the silicones is not discussed, but there is a very complete account of the physical properties and the applications of these resins to the plastics industry itself. Melamine resins which have been used for some time as the raw material for plastic tableware are the subject of a paper reviewing the progress between the two conventions. Attention is focused upon methylol melamine and its alkylated derivatives which have found many uses in the textile industry notably in the shrink-proofing of wool.

The very first paper is a speculative economic survey of the plastics industry since the war. Although it tends to give the impression of being wise after the event, nevertheless, it provides an interesting perspective of the development of the industry. It is surprising to read that despite the great advances made in Germany during the war in the utilisation of acetylene for the production of plastics, there was no comparable development of the acetylene industry in this country, and that acetylene is still in short supply.

The present volume is in a much more satisfactory format than its predecessor, which was much too large and thin to be comfortably accommodated on the normal bookshelf. The discussions which are reported at the end of every group of papers seem to occupy a disproportionately large part of the text. It is felt that the material requires much more severe editing with the object of retaining only those comments which are strictly relevant.—J.R.M.

QUALITATIVE ANALYSIS & ANALYTICAL CHEMICAL SEPARATIONS. By P. W. West, M. M. Vick and A. L. Le Rosen. The Macmillan Company, New York. 1953. Pp. xii + 223. $3.75.

Among the numerous text-books on qualitative analysis that exist and that continue to appear, it is refreshing to find one that is radically different from all the rest. The senior author of this book has been in the

forefront of those American teachers who have fought against the gradual disappearance of qualitative analysis as a pedagogical tool, a relegation which must in large part be attributed to the relatively static condition of this branch of instruction for almost a century. The conventional sulphide separations have to a great extent lost their value as an actual practical aid to analysis; their range of utility for teaching purposes is restricted by a number of theoretical limitations; and when to this is added the unpleasant nature of the principal reagent, some excuse can be found for the current American trend to replace courses in qualitative analysis by other less objectionable if not necessarily more valuable forms of instruction.

By courageously jettisoning the classical sulphide separations in favour of a non-sulphide scheme based on insoluble benzoates and fluorides, the authors have produced a course which certainly seems attractive. The authors claim that, in addition to removing the many objectionable features of sulphuretted hydrogen as a reagent, their scheme provides for sharper separations, approximating more closely to those usual in quantitative analysis; and although the theory is simplified considerably, it enables all the important principles of the older methods to be retained, at the same time providing for the treatment of certain other valuable concepts not normally found in this context.

The layout of the book, too, is psychologically interesting. In many text-books of qualitative analysis the first half is devoted to theory and the second half to practice. It is not rational to expect that the student will work through the first half before he attempts any practical work. But the physical operation of passing over the first hundred pages to carry out the first experiments often result in the student's being mentally inhibited from going back to correlate his practice with the theory. He is quite capable of 'finishing' the book without remembering he has skipped an important moiety.

In this book there is a preliminary chapter which is entitled 'Introduction to Laboratory Work.' This, in addition to containing the normal practical hints, gives an orientating outline of the whole inter-relation of solubility product, ionisation constant, hydrolysis constant and stability constant. Then follows the practical part; so that the student is at least acquainted with the fact that his duties involve the relation of theory to practice. Finally there comes the more detailed theoretical treatment. Until the student has worked forward and related this to his practical work, the 'unfinished' book ought to be a mute reproach to him.

The theoretical treatment strikes one as being fresh and so fully illustrated with examples and problems that theory and practice seem here to present a more integrated whole than in any other textbook that the reviewer can recall. This may in part result from the more satisfactory illustrations now available because of the novel scheme. But a considerable part arises, it is felt, from the careful selection and treatment of the material by the authors.

Every teacher of chemistry should be aware of the existence of this book, and should make himself familiar with its contents. He will learn from it even if he cannot bring himself to introduce it to his students. The unorthodox scheme will, inevitably, be treated with caution. However, the reviewer ventures to suggest that it is worthy of a serious trial—even if run in parallel with the more usual methods for a time.—CECIL L. WILSON.

USA Companies Co-operate

MATHIESON Chemical Corporation, Baltimore, has made an arrangement with Pennsylvania Salt Manufacturing Co. whereby the latter will have available Mathieson's experience in the large-scale generation of chlorine dioxide for use in paper mills. Pennsalt will promote the use of Mathieson's chlorine dioxide generation system and will make available its own experience in that field. Pennsalt manufactures sodium chlorate from which chlorine dioxide is produced in the Mathieson generation system. Mathieson's process has been used for years as one step in its manufacture of sodium chlorite.

Mathieson has an extensive patent structure in the field of chlorine dioxide generation and use for cellulose bleaching. Immunities agreements have been entered into with a number of paper companies covering operations within the scope of Mathieson's patents. Chlorine dioxide bleaching is finding increasing application in the pulp industry.

• HOME •

Non-ferrous Metal Mining

An association is to be formed, representing all those engaged in the non-ferrous metal mining industry, to serve as a channel through which Government or other authorities can confer with the industry. A formation committee has been appointed under the chairmanship of Mr. Sydney E. Taylor, with headquarters at 2 White Lion Court, Cornhill, London, E.C.

Essay Competition

All who are eligible are reminded that manuscripts of essays for the Institute of Metals Students' Essay Competition must reach the secretary of the Institute at 4 Grosvenor Gardens, London, S.W.1, on or before 1 January next. Essays, 2,500-3,500 words long, must be typewritten, with double-line spacing. Choice of subject is left to competitors, except that subjects relating exclusively to extraction or ferrous metallurgy are ineligible.

Seed Crushing

At a meeting under the auspices of the Royal Society of Arts at John Adam Street, Adelphi, London, W.C.2, on 9 December, at 2.30 p.m., a paper on 'The Seed Crushing Industry' will be given by Dr. E. G. Woodroofe, technical director, The British Oil & Cake Mills, Ltd. The paper will be illustrated with lantern slides.

New Leeds Laboratories

The new laboratories of the Biochemistry Department of Leeds University were formally opened last week by Sir Rudolph Peters, Whitley Professor of Biochemistry at Oxford University. In doing so he said biochemistry was virtually as active, perhaps even more so, than atomic physics. They must have the space to train more biochemists so that the demands of those who required them could be met.

Modern Plant for Witco

Witco Chemical Co., Ltd., have acquired a modern manufacturing plant at Union Lane, Droitwich Spa, Worcs. At this new factory they will manufacture latex compounds and auxiliary chemicals, adhesives, wax and rosin sizes and certain types of lubricants and emulsions.

Tungsten Ore

The Ministry of Materials announced this week that its selling price for tungsten ores of standard 65 per cent grade and ordinary quality is reduced from 225s. to 210s. for wolfram and from 210s. to 195s. for scheelite. These prices are per long ton unit delivered consumers' works.

Chemical Exports in October

The value of chemical exports showed an encouraging rise during October, being £11,496,156, compared with £10,526,119 during September. Figures for the same months last year were £10,670,457 and £10,616,689. The increase is due largely to drugs and dyestuffs; exports of ammonium compounds rose in value, but were very much less than in October, 1952. Copper sulphate showed a large decrease in value, and sodium compounds also fell. Exports to Australia showed a particular improvement, but exports to the USA fell.

'Terylene' Goes Ahead

Addressing the Yorkshire section of the Textile Institute, in Bradford, Dr. P. W. Carlene, of the Terylene Council of I.C.I., Ltd., said that although there were many problems yet to be solved, the development of Terylene continued. As soon as more information had been accumulated on the behaviour of this new synthetic fibre an account of their findings would be given so that full use could be made of them in industry.

Changes of Address

The General Asphalte Co., Ltd. (Chemical Engineering Division) has changed its address from Hope House, 41/49 Great Peter Street, London, S.W.1, to Grafton Road, London, N.W.5. We are informed by W. Edwards & Co. (London), Ltd., that they have moved to new premises at Crawley and all communications for them should now be addressed to Manor Royal, Crawley, Sussex. The Scottish branch remains at 44 West George Street, Glasgow.

• OVERSEAS •

New Plant in Texas

The first polyethylene plant of the Monsanto Chemical Co. in America is to be built at Texas City, where ethylene is available from the company's present Texas Division.

West German Plastics

Production of plastics in West Germany in 1953 is expected to reach 225,000 tons—nearly 18 per cent increase on 1952. The future of the industry depends upon an increase of exports, at present about 16 per cent of output, but foreign competition is growing.

Andean Pipeline Projected

The construction of a pipeline through the Andes, to connect the Eastern Peru oilfields with the Pacific ports, has been proposed. It is 350 miles from the coast to the nearest field at Puerto Melendez, and to connect with Ganso Azul would require an additional 500 miles of line. Peruvian experts are studying the recently-constructed Canadian pipeline through the Rockies.

Turkish Developments

A sulphuric acid plant is to be constructed at the Murgul copper mine, Turkey, also a superphosphate plant, to use the sulphuric acid as raw material. It is possible that a nitrogen industry will be established in Kütahay to manufacture nitrogen fertilisers and to meet the demands of Turkish national defence for nitrogen.

Signs of Oil

Promising signs of oil were recently found in the Nanharkatiya area in Assam at a depth of about 10,000 ft., according to an announcement by Mr. K. D. Malaviya, Deputy Minister for Natural Resources and Scientific Research. Replying to a question, he said that prospecting was still being conducted in the area.

New Brazilian Venture

Phthalic anhydride production in Brazil has been started by 'Industria Quimica Produtos Ftalicos' at its Mogi das Cruzes plant. This is the first commercial production of phthalic anhydride in the country. Present capacity is 30 tons per month, with increased output planned to coincide with the start of production in the company's new phthalate plasticiser plant.

Polish Fertiliser Factory

Preliminary trials have started ahead of schedule in the sulphuric acid department of the phosphate fertiliser works at Torun, Poland.

Explosions at 'Secret' Works

Five explosions are reported to have occurred last week at the Maywood (New Jersey) chemical works, where 'secret' US Navy production was in hand. Parts of Bergen County, two miles away, were shaken by the blasts. Official censorship prevented disclosure of the cause and extent of the damage.

Germans to Mine Uranium

According to an announcement by Professor Werner-Heisenberg, who was Germany's Director of Atomic Research during the war, preparations to mine uranium in Germany are now under way, with Allied permission. Uranium deposits occur in at least two places in Western Germany—the Black Forest and the Fichtel Mountains.

US Synthetic Rubber

American rubber manufacturers were warned by Representative Paul Shafer (Michigan) at a meeting in New York that unless private traders made up their minds to buy the Government-operated synthetic rubber industry there would be serious consequences, both for the US and South-east Asia.

Canadian Oil Development

According to the Petroleum Press Service, the rapid growth and high promise of Canadian oil development is shown by the fact that proved reserves of crude oil have increased from more than 45,000,000 barrels in 1946 to an estimated figure of more than 2,000,000,000 barrels at present.

Record Sales Anticipated

The Manufacturing Chemists' Association in the USA predicts that the sales volume of its 135 members will reach a new peak of $17,000,000,000 this year. The Association represents 93 per cent of the US chemical industry. Mr. William C. Foster, president, says that the volume of sales for the chemical industry may even be doubled within the next 10 to 15 years because of new products being introduced.

• PERSONAL •

Oxford University is to confer the honorary degree of Master of Arts on LADY ROBINSON, M.Sc., wife of Sir Robert Robinson, Waynflete Professor of Chemistry, in recognition of her own work as a chemist and as hostess to visiting scientists.

MR. H. M. BRAID and DR. F. ROFFEY have been appointed directors of The Distillers Company.

The American Institute of Chemical Engineers has announced the granting of its annual Junior Member Award to PROFESSOR LEROY ALTON BROMLEY, associate professor of chemical engineering, University of California, Berkeley. The award is granted for the papers judged most outstanding of those published by a junior member in *Chemical Engineering Progress*, the major publication of the A.I.Ch.E. for the three-year period 1950-1952.

MR. J. E. TROYAN has been appointed vice-president and general manager of the Matholin Corporation, Baltimore, and MR. DON W. RYKER assistant manager. Matholin Corporation was formed last July by Mathieson Chemical Corporation and Olin Industries, Inc., to manufacture and conduct research on hydrazine. Both Mr. Troyan and Mr. Ryker are members of the American Institute of Chemical Engineers.

The eighteenth William H. Walker Award granted annually by the American Institute of Chemical Engineers for distinguished contribution to chemical engineering literature will be given this year to DR. WILLIAM ROBERT MARSHALL, Jr., professor of chemical engineering and associate dean of the College of Engineering, University of Wisconsin, Madison, Wisconsin. The award is granted in memory of a USA pioneer in modern chemical engineering, the late Professor William H. Walker, professor of chemical engineering at Massachusetts Institute of Technology. Dr. Marshall, a nationally known authority on drying, will receive the award in recognition of his publication record over the years and in particular of his contribution of nine papers to *Chemical Engineering Progress*, the A.I.Ch.E. publication, during the three-year period 1950-52. The papers cover various aspects of the field of drying.

MR. RONELLO B. LEWIS has been appointed vice-president and comptroller of Mathieson Chemical Corporation, Baltimore. MR. J. V. JOYCE continues as a vice-president in an active capacity. Mr. Lewis will be in charge of all the Corporation's accounting activities.

Obituary

MR. HAMILTON BRINSLEY BUSH, joint managing director of W. J. Bush & Co., whose death we briefly recorded last week, died after a very brief illness caused by a virus infection possibly contracted during a recent visit to India. He was a grandson of the founder of the company and one of three sons of the late Mr. A. W. Bush, who was joint managing director from 1897 to 1935. Born in London in 1896, Mr. Brinsley Bush was educated at Highgate School. He joined the company in 1920 and was joint manager from 1931 to 1934, when he became joint managing director. He was also a director of W. J. Bush & Co., Inc., USA, of W. J. Bush & Co. (Canada), Ltd., and of W. J. Bush South Africa (Pty.) Ltd. At an early period he became associated with W. J. Bush Citrus Products Co., Inc., at National City, USA, and while in California met Miss Elizabeth Marden, whom he married. There were no children and his wife died before him. Since the war, Mr. Brinsley Bush was responsible for the sales direction of the company within the UK and abroad, and frequently visited the company's overseas establishments and the various agencies throughout Europe and in South Africa. His activities with trade associations were numerous. He was chairman of the BEMA/FCMA Joint Technical Committee, a member of the SDI Co-ordinating Advisory Council and deputy chairman of the Flavouring Compound Manufacturers' Association.

Publications & Announcements

JUST issued is the 'Calendar for 1953-54' of the Pharmaceutical Society. The contents include a list of new additions to the library during 1952, and details of publications of the Society; the approved alterations to the Examination Regulations; and in the legal section, the Pharmacy Act 1953, the Poisons Rules 1952, the Dangerous Drugs Regulations 1953, the Therapeutic Substances (Prevention of Misuse) Act 1953, the Control of Isoniazid Regulations, 1953, and the Antibiotics for Agricultural Purposes Regulations 1953. Copies of the Calendar may be obtained price 12s. 6d. (postage 10d.) from the Society at 17 Bloomsbury Square, London, W.C.1.

* * *

THE 1954 edition of the booklet, 'Physical Properties of Synthetic Organic Chemicals,' has just been issued by Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation. This 20-page booklet is issued annually and is a helpful guide for users of organic chemicals. The 1954 edition presents data on more than 330 products and features 36 new chemicals. For easy reference, the chemicals are arranged by family groups. Condensed data on applications are presented and physical properties are given in tabular form. Copies may be obtained without charge from Carbide and Carbon Chemicals Company, 30 East 42nd Street, New York 17, New York.

* * *

'THE Structure and Mechanical Properties of Copper-Manganese-Tin Alloys' has recently been issued by the Tin Research Institute. It describes a range of new alloys which may be useful in the fields hitherto served by nickel silver. The alloys meet the demand for a white metal at a competitive cost, which can readily be cast, forged, rolled, stamped, etc., and has an adequate resistance to corrosion. It is satisfactory as a basis metal for the usual plating finishes used in industry. The publication gives detailed information on the properties of a wide range of compositions and indicates how compositions and methods of treatment may be varied to give strength, colour or deformability, etc., as may be required. Copies of this paper, originally published in the *Journal of the Institute of Metals*, may be obtained gratis from the Tin Research Institute, Fraser Road, Perivale, Greenford.

* * *

AS a convenient means for checking the composition of metals and alloys, quantitative spectrochemical methods of analysis are widely adopted and for several years there has been a demand for reliable standards, suitable for these methods, that can readily be obtained when required by prospective users who lack the facilities or the time to prepare their own standards. Johnson, Matthey & Co., Ltd., Hatton Garden, London, E.C.1, whose existing range of spectrographically standardised substances is already well established, can supply several graded series of standards for quantitative spectrochemical analysis. These have been subjected to very thorough analyses, full details of which are included in the laboratory report provided with each set. Publication No. 1763, obtainable from the company, describes the standards, the ranges of composition they cover and the type of material they are suitable for testing.

* * *

A REPORT providing a summary in simple language of the research carried out at the Royal College of Science during the three years 1950-52 has been published. Last year City and Guilds College published a similar review of their research in engineering, and it is hoped that next year the Royal School of Mines will complete the trilogy. An attempt has been made to steer a middle course between specialist technicalities and over-simplification, but some aspects of the work are in their nature so complicated that a description in simple language is not possible. Some of the more abstruse material has therefore been omitted altogether, but it is hoped that the report will give an outline of the scientific work of the College which will be useful to its friends in general in the world of science and industry.

* * *

AMONGST a number of interesting articles in 'Science News 30' published on 20 November by Penguin Books Ltd., is one by D. G. Cooper, Head of the Science Department at Birkenhead Technical College, describing 'The Impact of Modern Detergents.'

Drugs for NHS

Sir Harry Jephcott's Comments

CRITICISM of the Ministry of Health for its suggested failure to obtain for the National Health Service the drugs it needs at the lowest possible price is commented upon by Sir Harry Jephcott, chairman and managing director of Glaxo Laboratories Ltd., in a review accompanying the accounts for the year ended 30 June last.

It is important, says Sir Harry, that in this quest for economy nothing should be done to impair the ability of the British pharmaceutical industry to stay in the forefront of research and steadily to increase the volume and value of its exports.

Referring to the Ministry's list of products which 'have not been proved of therapeutic value,' Sir Harry points out that medical practice is not uniform throughout the world and products so classified were in considerable use in many markets. In some overseas countries it was a condition of purchase that the preparation concerned be on sale in the country of origin. The implied criticism in the Ministry's classification could thus prevent the supply of preparations that the doctor abroad required.

Research Effort

The company experienced a net decrease of about four per cent in total export business during the period under review, due not so much to any fall in demand, however, as to the imposition of import restrictions, which was mitigated by reducing stocks. Revenue from home sales showed a small increase, price reductions being more than offet by the greater volume of business.

In a reference to research, Sir Harry says that during the past two years and more the company had expanded much effort upon the synthesis of cortisone, in the first instance from ergosterol, and, more recently, from hecogenin. The latter route had been studied in collaboration with the Medical Research Council. Though both syntheses had been successfully accomplished in an academic sense, the former was judged unlikely to be of commercial value. Work upon the production of cortisone from hecogenin continued, but much remained to be done.

The group trading profit is shown by the accounts as being £3,071,000, compared with £3,589,000 for the previous year, but as adjusted tax provisions were £637,000 lower at £1,582,00, this led in fact to a very slight increase in the group profit after tax and all charges. The proposed final dividend on the ordinary stock is 12 per cent, less tax, which, with the interim dividend of 5 per cent, makes 17½ per cent for the year, compared with 15 per cent last year.

Manufacturing Rights Sought

AN American company which specialises in the international exchange of manufacturing rights has recently been formed. This company seeks new British products or processes whose manufacture or use it will sponsor in the United States on a basis of royalties or outright sale. It also arranges for the licensing of foreign manufacture of American products.

The firm is known as Porter International Company with offices at 1025 Connecticut Avenue, N.W., Washington, D.C.

The president of the company is Paul R. Porter, formerly director of the European office of the US Mutual Security Agency. The chairman of the board is William C. Foster, president of the Manufacturing Chemists' Association and formerly Deputy Secretary of the US Department of Defence. Directors include W. John Kenney, formerly Chief of the Economic Cooperation Mission to the United Kingdom; W. F. Rockwell, Jr., president of the Rockwell Manufacturing Company, well-known makers of valves and meters; T. Reed Vreeland, president of the International Bank of Washington; and George L. Artamonoff, formerly president of Sears International, Inc., and the Drake America Corporation.

The American company is especially interested in securing US manufacturing rights for new products of British design in the fields of mechanical and electrical engineering, chemistry, electronics, and aircraft.

Price Reduction

As a result of a reduction in ocean freight, Clifford Christopherson & Co., Ltd., 49 Park Lane, London, W.1, have announced that their prices for 'Buffalo' borax and boric acid have been reduced by £1 a ton.

British Chemical Prices

LONDON.—An active inquiry has been reported for most of the industrial chemicals with delivery to home consumers continuing on a satisfactory scale. The supply position generally is fairly good but there are exceptions such as titanium, which is extremely difficult for spot delivery.

The reduction of £1 per ton on borax and boric acid, which was to be made effective on December 1 is already in force and contract deliveries are to receive the benefit of the lower prices. Unchanged rates continue to be quoted for the chemical compounds of the non-ferrous metals.

Reports indicate that the volume of export trade remains fairly steady.

The active demand for the coal tar products has been fully maintained, particularly for the light distillates creosote oil and phenol, while some improvement in the demand has been noted for cresylic acid and pitch.

MANCHESTER.—New inquiries for heavy chemicals on the Manchester market during the past week have been on a fair scale and a moderate amount of actual business has been placed, the bulk of it for near delivery positions. Leading users, including the textile bleaching, dyeing and finishing trades, are calling for steady supplies against contracts already placed, while on export account shipments have been maintained at around the recent level. Values generally are steady. There is a continued good demand for basic slag among the fertilisers and trade in some other descriptions is gradually improving. Creosote oil, benzol, xylol and toluol, in the by-products market, are going steadily into consumption.

GLASGOW.—Manufacturers and merchants report another satisfactory trading period. The demand from the textile industry continues to remain at a high level and generally speaking trade on the whole has continued to maintain the upward trend experienced about four weeks ago.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £86. 80% pure, 10 tons, £92 ; commercial glacial 10 tons, £94 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £138 per ton.

Acetone.—Small lots : 5 gal. drums, £143 per ton ; 10 gal. drums, £125 per ton. In 40/50 gal. drums less than 1 ton, £105 per ton ; 1 to 9 tons, £105 per ton ; 10 to 49 tons, to £103 per ton ; 50 tons and over, £102 per ton.

Alcohol BSS, Butyl.—£161 per ton in 10-ton lots.

Alcohol, Ethyl.—300,000 gal. lots, d/d., 2s. 11d. per proof gallon ; 100,000 and less than 200,000 gal. lots, d/d, 3s. per proof gallon.

Alum.—Ground, about £23 per ton, f.o.r. MANCHESTER : Ground, £25.

Aluminium Sulphate.—Ex works, £14 15s. per ton d/d. MANCHESTER : £14 10s. to £17 15s.

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

Ammonium Bicarbonate.—2 cwt. non-returnable drums : 1 ton lots £58 per ton.

Ammonium Chloride. — Grey galvanising, £31 5s. per ton, in casks, ex wharf. Fine white 98%, £25 to £27 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER : £6 5s. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £93 and £91 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5-cwt. lots as to grade, etc., 2s. 2d. to 2s. 8d. per lb. Crimson, 3s. 4½d. to 4s. 5¼d. per lb.

Arsenic.—Per ton, £59 5s. nominal, ex store.

Barium Carbonate.—Precip., d/d ; 2-ton lots. £35 5s. per ton, bag packing.

Barium Chloride.—£42 5s. per ton in 2-ton lots.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £38 per ton d/d ; 2-ton lots, £38 5s. per ton d/d.

Bleaching Powder.—£21 per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid : Anhydrous, £58 10s.; in 1-cwt. bags ; commercial, granular, £38 10s. ; crystal, £41 ; powder, £42 ; extra fine powder, £43 ; B.P., granular, £47 10s. ; crystal, £50 ; powder, £51 ; extra fine powder, £52.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid : Commercial, granular, £67 ; crystal, £75 ; powder, £72 10s. ; extra fine powder, £74 10s. ; B.P., granular, £80 ; crystal, £84 10s. ; powder, £87 ; extra fine powder, £86 10s.

Butyl Acetate BSS.—£173 per ton, in 20-ton lots.

***sec.* - Butyl Alcohol.**—5 gal. drums £159 ; 40 gal. drums : less than 1 ton £124 per ton ; 1 to 10 tons £123 per ton ; 10 tons and over £122 per ton ; 100 tons and over £120 per ton.

***tert.* - Butyl Alcohol.**—5 gal. drums £195 10s. per ton ; 40 45 gal. drums : less than 1 ton £175 10s. per ton ; 1 to 5 tons £174 10s. per ton ; 5 to 10 tons, £173 10s. ; 10 tons and over £172 10s.

Calcium Chloride.—70/72% solid £12 10s. per ton.

Chlorine, Liquid.—£32 per ton d/d in 16/17-cwt. drums (3-drum lots).

Chromic Acid.—2s. 0¼d. to 2s. 0¾d. per lb., less 2½%, d/d U.K.

Citric Acid.—1-cwt. lots, 205s. cwt. ; 5-cwt. lots, 200s. cwt.

Cobalt Oxide.—Black, delivered, 13s. per lb.

Copper Carbonate.—MANCHESTER : 2s. 3d. per lb.

Copper Sulphate.—£74 per ton f.o.b., less 2% in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £10 2s.

Diacetone Alcohol.—Small lots : 5 gal. drums, £162 per ton ; 10 gal. drums, £172 per ton. In 40/45 gal. drums ; less than 1 ton, £142 per ton ; 1 to 9 tons, £141 per ton ; 10 to 50 tons, £140 per ton ; 50 to 100 tons, £139 per ton ; 100 tons and over, £138 per ton.

Ethyl Acetate.—10 tons lots, d/d, £135 per ton.

Formaldehyde.—£37 5s. per ton in casks, d/d.

Formic Acid.—85%, £82 10s. in 4-ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1.260 S.G., £14 7s. 6d. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hydrochloric Acid.—Spot, about 12s. per carboy d/d, according to purity, strength and locality.

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

Hydrogen Peroxide.—27.5% wt. £124 10s. per ton. 35% wt. £153 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 16s. 4d. per lb. in 28 lb. lots.

Iodoform.—25s. 10d. per lb. in 28 lb. lots.

Lactic Acid.—Pale tech., 44 per cent by weight £122 per ton ; dark tech., 44 per cent by weight £67 per ton ex works 1-ton lots ; dark chemical quality 44 per cent by weight £109 per ton, ex works ; usual container terms.

Lead Acetate.—White : About £136 per ton.

Lead Nitrate.—About £116 per ton.

Lead, Red.—Basis prices per ton. Genuine dry red lead, £124 ; orange lead, £136. Ground in oil : red, £150 10s. ; orange, £162 10s.

Lead, White.—Basis prices : Dry English, in 5-cwt. casks £142 per ton. Ground in oil : English, under 2 tons, £162 15s.

Lime Acetate.—Brown, ton lots, d/d, £40 per ton ; grey, 80-82%, ton lots, d/d, £45 per ton.

Litharge.—£124 per ton, in 5-ton lots.

Magnesite.—Calcined, in bags, ex works, £22 to £24.

Magnesium Carbonate.—Light, commercial, d/d, 2-ton lots, £84 10s. per ton, under 2 tons, £92 per ton.

Magnesium Chloride.—Solid (ex wharf), £16 per ton.

Magnesium Oxide.—Light, commercial, d/d, under 1-ton lots, £245 per ton.

Magnesium Sulphate.—£15 to £16 per ton.

Mercuric Chloride.—18s. 3d. per lb. in 5 cwt. lots ; smaller quantities dearer.

Mercury Sulphide, Red.—22s. 3d. per lb., for 5-cwt. lots.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 5s. 4½d. per gal. ; pyridinised 64° O.P. 100 gal., 5s. 6½d. per gal.

Methyl Ethyl Ketone.—10-ton lots, £141 per ton del.

Methy *iso*Butyl Ketone.—10 tons and over £162 per ton.

Nickel Sulphate.—D/d, buyers U.K. £154 per ton. Nominal.

Nitric Acid.—£35 to £40 per ton, ex-works.

Oxalic Acid.—Home manufacture, in 5-cwt. casks, £139 per ton, carriage paid.

Phosphoric Acid.—Technical (S.G. 1.700) ton lots, carriage paid, £87 per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 3½d. per lb.

Potash, Caustic.—Solid, £94 10s. per ton for 1-ton lots ; Liquid, £37 15s.

Potassium Bichromate.—Crystals and granular, 11⅝d. per lb. ; ground, 1s. ⅝d. per lb., standard quantities.

Potassium Carbonate. — Calcined, 96/98%, £59 10s. per ton for 1-ton lots, ex-store.

Potassium Chloride.—Industrial, 96%, t-ton lots, £23 to £25 per ton.

Potassium Iodide.—B.P., 14s. 10d. per lb. in 28-lb. lots ; 14s. 4d. in cwt. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 9½d. per lb. for 1-cwt. lots ; for 3 cwt. and upwards, 1s. 8½d. per lb. ; technical, £8 11s. 6d. per cwt. ; for 5 cwt. lots.

***iso*Propyl Alcohol.**—Small lots : 5 gal. drums, £118 per ton ; 10-gal. drums, £108 per ton ; in 40-45 gal. drums ; less than 1 ton, £83 per ton ; 1 to 9 tons £81 per ton ; 10 to 50 tons, £80 10s. per ton ; 50 tons and over, £80 per ton.

Salammoniac.—Dog-tooth crystals, £70 per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid. — MANCHESTER : Technical 2s. 7d. per lb. d/d.

Soda Ash.—58% ex-depot or d/d, London station, about £14 3s. per ton.

Soda, Caustic.—Solid 76/77% ; spot, £25 to £27 per ton d/d. (4 ton lots).

Sodium Acetate.—£70 to £75 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £13 10s. to £15 10s. per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 9¾d. per lb. ; anhydrous, 11¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £40 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.—£75 15s. to £82 per ton.

Sodium Cyanide.—100% basis, 9¾d. to 10¾d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton ; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 16s. 4d. per lb. in 28-lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £123 ton.

Sodium Metasilicate.—£22 15s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, over 98% 6-ton lots, d/d station, December-February, £26 10s.

Sodium Nitrite.—£31 per ton (4-ton lots).

Sodium Percarbonate.—12½% available oxygen, £8 2s. 10½d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £37 10s., anhydrous, £78 10s. ; tri-sodium, crystalline, £39 10s., anhydrous, £75 10s.

Sodium Prussiate.—1s. to 1s. 1d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

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

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £6 10s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot, £31 per ton, d/d, in drums ; broken, £32 per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £59 per ton ; pea crystals, £37 12s. 6d. per ton d/d station in kegs ; commercial, £23 7s. 6d. per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £22 16s. 6d. to £25 6s. according to fineness.

Tartaric Acid.—Per cwt. : 10 cwt. or more, £10 10s.

Titanium Oxide.—Standard grade comm., with rutile structure £143 per ton ; standard grade comm., £130 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d : white seal, £92 10s. ; green seal, £91 10s. ; red seal, £90.

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 3¼d. to 3s. 1½d. per lb. Crimson, 3s. 4¼d. to 4s. 5¼d. per lb.

Carbon Bisulphide.—£60 to £65 per ton, according to quality.

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

Carbon Tetrachloride.—Ton lots, £74 10s. per ton.

India-rubber Substitutes.—White, 1s. 6¾d. to 1s. 10½d. per lb. ; dark, 1s. 4½d. to 1s. 8d. per lb.

Lithopone.—30%, £50 per ton.

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

Sulphur Chloride.—British, £55 per ton.

Vegetable Lamp Black.—£64 8s. per ton in 2-ton lots.

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

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £16 2s. 6d.

Compound Fertilisers.—Per ton in 6 ton lots, d/d farmer's nearest station, I.C.I. Special No. 1 £27 9s.

'Nitro-Chalk.'—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots, d/d nearest station, July to September, £26 5s. per ton ; October to November, £26 7s. 6d. per ton.

Coal-Tar Products

Benzole.—Per gal., minimum of 200 gals., ex-works, 90's, 4s. 10¾d. ; pure, 5s. 2d. ; nitration grade, 3s. 7d.

Carbolic Acid.—Crystals, 1s. 4d. to 1s. 6¼d. per lb. Crude, 60's, 8s. MANCHESTER : Crystals, 1s. 4½d. to 1s. 6¼d. per lb., d/d crude, 8s. naked, at works.

Creosote.—Home trade, 1s. to 1s. 4d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 1s. to 1s. 8d. per gal.

Cresylic Acid.—Pale 99/99½%, 5s. 8d. per gal. ; 99.5/100%, 5s. 10d. American, duty free, for export, 5s. to 5s. 8d. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 10d. per gal. for 1000-gal. lots ; heavy, 90/190°, 4s. 3½d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, 4-ton lots, in sellers' bags, £14 12s. to £22 per ton, according to m.p. ; hot pressed, £28 per ton in bulk ex-works ; purified crystals, £53 per ton d/d.

Pitch.—Medium, soft, home trade, 160s. per ton f.o.r. suppliers' works ; export trade, 230s. per ton f.o.b. suppliers port.

Pyridine.—90/160°, 32s. 6d. to 35s. per gal. MANCHESTER : 42s. 6d. to 45s. per gal.

Toluol.—Pure, 5s. 7d. ; 90's, 4s. 10d. per gal., d/d. MANCHESTER : Pure, 5s. 6d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 8d. to 5s. 10d. per gal., according to grade, d/d.

Intermediates and Dyes (Prices Nominal)

***m*-Cresol 98/100%.**—3s. 9d. per lb. d/d.

***o*-Cresol 30/31° C.**—1s. 4d. per lb. d/d.

***p*-Cresol 34/35° C.**—3s. 9d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—88/89°C., 1s. 11d. per lb.

Dinitrotoluene.—S.P. 15° C., 1s. 11½d. per lb. ; S.P. 26° C., 1s. 3d. per lb. S.P. 33°C., 1s. 1½d. per lb. ; S.P. 66/68°C., 1s. 9d. per lb.

***p*-Nitraniline.**—4s. 5½d. per lb.

Nitrobenzene.—Spot, 9¼d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—2s. per lb.

***o*-Toluidine.**—1s. 7d. per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—5s. 6d. per lb., in casks.

Dimethylaniline.—3s. 1d. per lb., packed in drums, carriage paid.

Chemical & Allied Stocks & Shares

THE upward movement in stock markets, after gathering renewed strength under the lead of industrial shares, was followed by a reaction. Profit-taking was inevitable after the advance, but sentiment was also affected by Mr. Butler's warning that big efforts will be needed in export markets if our gold and dollar reserves are to hold the improvement shown this year. The warning came as a reminder that unless exports expand, some companies which have recently announced higher dividends may not be able to maintain these increased payments in the future. A study of dividend announcements shows that increases have come largely from companies which for years have distributed only a very small part of their profits.

Strong & Active Conditions

Reflecting the strong and active conditions in markets, chemical shares remained more prominent, though in line with the general tendency, they have not held best levels. Imperial Chemical, for instance, have receded to 49s. 9d. at the time of writing, compared with 50s. 9d. a month ago. Fisons, with a rise from 40s. to 42s. 3d. reflected the higher dividend. Elsewhere, Unilever responded to their increased interim and the directors' forecast of the bigger total for the year and were 55s. 9d., against 54s. a month ago. Unilever N.V. rose during the same period from 49s. 3d. to 51s. 6d. Monsanto at 22s. 3d. were virtually unchanged on balance, as were British Chrome Chemicals at 16s. 3d. while Laporte 5s. shares eased from 13s. to 12s. 7½d. and Hickson Welch 10s. shares kept at 9s. 4½d. Albright & Wilson 5s. shares were 17s. 10½d., against 17s. 4½d. a month ago, but a big rise—from 35s. 1½d. to 40s.—has been recorded in Borax Consolidated deferred units. Reichhold Chemical 5s. shares firmed up from 7s. 1½d. to 7s. 4½d. and Yorkshire Dyeware 5s. shares from 7s. 9d. to 8s. 3d.

Hardman & Holden 5s. shares were 9s. 4½d. Greeff-Chemicals 5s. shares 14s. 6d., Brotherton 10s. shares 24s. 4½d., while British Glues & Chemicals 4s. shares firmed up on balance from 10s. 6d. to 11s. Coalite & Chemicals 2s. shares were slightly higher at almost 2s. 7½d. Plastics shares became more active, with British Xylonite at 31s. 9d., though Bakelite eased from 24s. 6d. to 24s.xd., and Kleemann 1s. shares lost a few pence at 10s. 1½d. following the unchanged dividend.

Boots Drug 5s. shares at 21s. 9d. reflected profit-taking after an earlier rise. Turner & Newall have not held best levels, but were 64s. 9d., compared with 59s. a month ago, helped by market hopes of a bigger dividend. Associated Cement at 63s. were 9d. higher on balance. Paint shares were wanted. Compared with a month ago, Lewis Berger 4s. shares have moved up from 9s. 3d. to 9s. 9d., Pinchin Johnson from 31s. 9d. to 33s. 9d. though Goodlass Wall were lower on balance at 25s. 9d., compared with 27s. and best levels have not been held by some other paint shares. Staveley were prominent with a big rally to 70s. on the directors' decision not to buy back the company's former steel assets but instead to make a cash pay-out of over £3,000,000 to shareholders. Triplex Glass 10s. shares gained 9d. at 22s. 9d. Powell Duffryn strengthened from 26s. to 27s. 3d. Oils were active. Compared with a month ago, Anglo-Iranian have moved up from £7⅞ to £8 1/16, Shell from 87s. 6d. to 92s. 6d. and helped by higher dividend and share bonus news, Trinidad Leaseholds 5s. shares rose to 35s. compared with 28s. 9d. a month ago.

New Tool Factory

THE new engineers' tool factory of Edgar Allen & Co. Ltd., at Shepcote Lane, Tinsley, is now in operation. The factory has been built to manufacture many types of tools, including butt-welded cutting tools; precision ground form tools; tungsten carbide tools and tips; high-speed steel toolholder bits; Athyweld deposit-welded tools and high-speed steel faced wood-working knives, etc.

Laid out on the most modern lines for progressive mass production, the factory is on a separate plot of land just beyond the existing large trackwork manufacturing department at Shepcote Lane. A single storey building, 230 ft. long by 160 ft. wide, it has been built to meet steadily increasing demand, extension of the original engineers' tool department being no longer possible without encroachment on neighbouring departments.

Next Week's Events

WEDNESDAY 2 DECEMBER

Royal Institute of Chemistry

Walthamstow: S.W. Essex Technical College, Forest Road, E.17, 7 p.m. F. Courtney Harwood: 'Modern Detergency.'

Pharmaceutical Society of Great Britain

London: 17 Bloomsbury Square, W.C.1, 7.30 p.m. Professor A. D. Macdonald: 'Applied Pharmacology.'

Society of Public Analysts & Other Analytical Chemists

London: Chemical Society, Burlington House, Piccadilly, 7 p.m. Professor C. H. Gray: 'Recent Advances in Medical Chemistry.'

Society of Cosmetic Chemists of Great Britain

London: St. Ermin's Hotel, Caxton Street, S.W.1, 7.45 p.m. Open meeting. Dr. J. H. Schulman: 'Molecular Interactions at the Solid-liquid Interface, with Special Reference to Emulsions Stabilised with Solid Particles.'

Society of Leather Trades Chemists Ltd.

Manchester: Chamber of Commerce, 2 p.m. G. J. Cutbush: 'Moisture Determination of Leather.'

THURSDAY 3 DECEMBER

Royal Institute of Chemistry

Reading: The University, 8 p.m. Professor J. W. Cook: 'Some Aspects of the Chemistry & Stereochemistry of Polycyclic Aromatic Compounds.'

Chemical Society

London: Burlington House, Piccadilly, 7.30 p.m. Reading of original papers.

Bristol: The University, 7 p.m. Joint meeting with RIC, SCI and Institute of Metals. L. Rotherham: 'Metallurgical Trends of Interest to the Chemical Industry.'

Society of Chemical Industry

London: Medical Society of London, 11 Chandos Street, Cavendish Square, W.1 6.15 p.m. Symposium on Dextran.

Institute of Fuel

Liverpool: 9 The Temple, Dale Street, 7 p.m. A. Marsh: 'The Modern Approach to Smoke Abatement.'

FRIDAY 4 DECEMBER

Royal Institute of Chemistry

Manchester: The University, 6.30 p.m. Joint meeting with CS and SCI. J. W. Trevan: 'Chemistry & Pharmacological Reactions.'

Chemical Society

Birmingham: The University, 4.30 p.m. H. M. Powell: 'Some Intermolecular Compounds.'

Society of Chemical Industry

Glasgow: Royal Technical College, 7.15 p.m. P. D. Ritchie: 'Some Recent Studies in Pyrolysis.'

Institute of Fuel

Cardiff: South Wales Institute of Engineers, Park Place, 6 p.m. H. G. Goddard: 'Insulation of Industrial & Other Large Buildings.'

Italian Phosphate

THE Akragas Company (Montecatini) has recently started building a factory near Porto Empedocle for the production of phosphatic fertilisers; the installation will include the following parts:

(a) an oleum plant with a possible daily output of 100 metric tons of concentrated acid (expressed as monohydrate);

(b) store for phosphate, composed of five silos of reinforced concrete with a diameter of 10 m. and a height of 21 m. (each silo can contain 2,000 metric tons of phosphate);

(c) a phosphate-grinding plant, with two self-ventilated mills able to grind 16-17 metric tons of phosphate per hour, corresponding to the quantity needed for the daily production of 30 metric tons of orthophosphoric acid and 170 metric tons of superphosphate (with 22-24 per cent of soluble P_2O_5);

(d) a plant for the production of orthophosphoric acid, designed for a daily output of 30 metric tons of P_2O_5;

(e) a plant for the production and granulation of superphosphate;

(f) a store for superphosphate, with a capacity of 36,000 metric tons of product.

All the necessary machines have been ordered from Italian manufacturers, with the exception of some measuring instruments and of the compressors for the oleum plant, which are to be purchased abroad. According to the general forecast, the factory will be completed within two years.

Law & Company News

Commercial Intelligence

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

Mortgages & Charges

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

CLAY & SON, LTD., London, E., fertiliser manufacturers, etc. 22 October, mortgage, to Midland Bank Ltd. securing all moneys due or to become due to the bank; charged on factory at Marshgate Lane, Stratford, E., with fixtures (subject to, etc.). *£43,825. 31 October, 1952.

DORMER PLASTICS, LTD., West Hartlepool. 20 October, debentures, to Lloyds Bank Ltd. securing all moneys due or to become due to the bank; general charge. *Nil. 7 February, 1952.

Satisfaction

MEDIPLASTICS LTD., Folkestone. Satisfaction, 30 October, of debentures registered 26 September, 1950, to the extent of £350.

Changes of Name

The following changes of name have been announced:—Northern Carbide Co., Ltd., to Belcro & Co., Ltd., on 4 November, 1953; Colgate-Palmolive-Peet Ltd., to Colgate-Palmolive Ltd., on 2 November, 1953.

New Registrations

Commonwealth Chemical Manufacturers Ltd.

Private company. (525,155.) Capital £100. Manufacturers, wholesalers and distributors of chemical products of all kinds, etc. Directors R. A. Watts, G. P. Cockhill, C. W. Hill, R. C. Ray. Reg. office: 34/40 Ludgate Hill, E.C.4.

W. H. Blake (Analysts) Ltd.

Private company. (525,291.) Capital £500. Objects: To undertake the testing for gas and injurious substances of all kinds in ships, tankers, and other vessels, oil refining and similar plant, etc. Directors: Thos. M. Anderson, and Jas. S. Dawson. Reg. office: Princes Buildings, 2 King Street, Newcastle-on-Tyne, 1.

F. E. Gage & Co. Ltd.

Private company. (525,270.) Capital £100. Chemists, manufacturers, importers and exporters of and dealers in chemicals, bleaching powders and liquids, etc. Directors: Frank E. Gage, Fdk. Roberts. Solicitors; Mooring Aldridge & Haydon, Christchurch.

Medica Ltd.

Private company. (525,757.) Capital £100. Wholesale or retail chemists, druggists and drysalters, etc. First directors are to be appointed by the subscribers. Solicitors: Stoneham & Sons, 108a Cannon Street, E.C.4.

J. Rogers (Laboratories) Ltd.

Private company. (525,626.) Capital £100. Manufacturing research, dispensing and analaytical chemists and druggists, etc. Directors: Joseph R. Forsyth and Mrs. Mary M. Forsyth. Reg. office: Prosperity House, 25 High Road, Ilford, Essex.

Company News

F. W. Berk & Co. Ltd.

At a meeting held on 18 November the directors of F. W. Berk & Co., Ltd., declared an interim dividend of 1¾d. per share, equivalent to 5 5/6 per cent. on the ordinary capital of the company, in respect of the year ending 31 December, 1953. Last year's interim was the same.

Burrell & Co. Ltd.

Mr. K. Burrell, chairman of Burrell & Co., Ltd., informs shareholders that the trend in demand for the company's products (chemical colours) has been well maintained in view of the considerable drop in profit suffered in respect of 1952 and despite lower margins he anticipates that results for 1953 will show an improvement upon those for last year. Nevertheless, the directors have thought it advisable not to increase the 6 per cent interim dividend.

Dowty Equipment Ltd.

A continued increase in activity, with rising turnover and profits, was referred to by Mr. G. H. Dowty, chairman and managing director of Dowty Equipment Ltd., in a statement circulated in connection with the annual meeting at Cheltenham on 23 November. In the statement, which covered the year ended 31 March last, Mr. Dowty said two strong features were their rapidly-growing activities with regard to industrial hydraulic equipment and their expanding interests overseas. During the year, additional factories had been opened in Canada and Australia and in this country. Although group sales had increased by 60 per cent over the previous year, net profit had increased by only 33 per cent. A final dividend of 12 per cent, free of tax, was recommended by the board, making 22 per cent for the year. This was an increase of 2 per cent over the previous year.

Evans Medical Supplies Ltd.

The directors of Evans Medical Supplies Ltd. have declared an interim dividend on the ordinary stock of 1½d. per 5s. stock unit, less tax, on account of the year ending 31 December next.

Hindley Brothers (Holdings) Ltd.

An interim dividend of 4 per cent on the ordinary shares has been declared by the directors of Hindley Brothers (Holdings) Ltd. The interim dividend last year was 2½ per cent. The directors state that in paying the increased amount they have taken into account both the improvement in trade and the desirability of paying a larger proportion of the anticipated total distribution as an interim payment.

Unilever Ltd. and Unilever N.V.

The interim ordinary dividends of Unilever Ltd. and Unilever N.V. on account of the year ending 31 December next are being raised by 1 per cent and ¼ per cent respectively. In the case of the English company this means a payment of 6 per cent, less tax, and the equivalent dividend in the case of the Dutch company is 5¼ per cent actual. The boards of the two companies announce their intention to recommend a final dividend of 9¾ per cent for Unilever Ltd. (compared with 8½ per cent last year) and 8¾ per cent for Unilever N.V. (compared with 7½ per cent).

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order 1952.

AMENDED

EXPERIMENTAL OFFICERS AND ASSISTANT EXPERIMENTAL OFFICERS in various Government Departments. The Civil Service Commissioners invite applications for pensionable posts. Applications may be accepted up to December 31, 1953, but an earlier closing date may be announced either for the competition as a whole or in one or more subjects.

The posts are divided between following main groups and subjects :—

(*a*) Mathematical and Physical Sciences
(*b*) Chemistry and Metallurgy
(*c*) Biological Sciences
(*d*) Engineering subjects ; and
(*e*) Miscellaneous (including, e.g., Geology, Library Technical Information Services).

AGE LIMITS : For Experimental Officers, at least 26 and under 31 on 31 December, 1953 ; for Assistant Experimental Officers at least 18 and under 28 on 31 December, 1953. Extension for regular service in H.M. Forces.

Candidates must have at least one of a number of specified qualifications. Examples are Higher School Certificate, General Certificate of Education, Scottish Leaving Certificate, Scottish Universities Preliminary Examination, Northern Ireland Senior Certificate (all in appropriate subjects and at appropriate levels). Higher National Certificate, University Degree. Candidates taking their examinations in 1953 may be admitted. Candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. In general, a higher standard of qualification will be looked for in the older candidates than in the younger ones.

INCLUSIVE LONDON SALARY SCALES :
Experimental Officer : £581-£838 (men) ; £586-£707 (women.)
Assistant Experimental Officer : £274-£607 (men) : £274-£511 (women).
Starting pay according to age up to 26. At 18, £274 ; at 26, £495 (men), £467 (women). Somewhat lower in provinces.

Further particulars and application forms from **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, TRINIDAD HOUSE, OLD BURLINGTON STREET, LONDON, W.1. quoting No. S94 9J/53. Completed application forms should be returned as soon as possible.** 21283/176/EH/a

FIRST-CLASS CHEMIST required by progressive Public Company in the North-West for research and development on synthetic resins and allied materials. Good Degree and previous experience desirable. Salary range, £1,000-£1,300 per annum. A Staff Superannuation Scheme is in operation. Applicants are requested to give details of their age, qualifications and previous experience **BOX No. C.A. 3277, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

FOR SALE

FOR SALE, approximately 8 tons **DDT POWDER.** Price 2s. 2d. per lb.; ex-works. Apply **BOX No. C.A. 3276, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

FOR SALE

CHARCOAL, ANIMAL AND VEGETABLE horticultural, burning, filtering, disinfecting, medicinal, insulating ; also lumps ground and granulated; established 1830 ; contractors to H.M. Government.— **THOS. HILL-JONES, LTD., "INVICTA" WORKS. BOW COMMON LANE, LONDON, E. TELEGRAMS : "HILL-JONES, BOCHURCH LONDON." TELEPHONE 3285 EAST.**

FOR SALE
— 3 —
ALL WELDED CIRCULAR TANKS,
EACH 12 ft. diam. by 12 ft. deep by ⅜ in. plate.
CLOSED TOP.
CAPACITY, 8,250 gallons each.
MADEN & McKEE, LTD.,
317, PRESCOT ROAD,
LIVERPOOL, 13.

ECONOMIC BOILERS—9 ft. diam. by 12 ft. 6 in. Foster Yates, 200 lb. w.p. ; 8 ft. diam. by 14 ft. Paxman, 180 lb. w.p. Twenty others, all sizes.
Whessoe Open Top Riveted Steel **MIXING TANK** 13 ft. diam., by 15 ft. deep, 9/16 in. plate.
NEW GALVANISED PIPING. Immediate delivery.
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9 Worssam **ROTARY PRESSES.**

POWDER DRESSING or **SIFTING MACHINES,** various sizes.

1 Johnson **FILTER PRESS,** 36 in. square, plate and frame type, double inlet and enclosed delivery ports.

1 Johnson **FILTER PRESS,** 47 plates, 32 in. square, centre feed, bottom corner open delivery.

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1 No. 1A water-cooled **CIRCULATOR MILL.**

6—Excellent Nickel-lined Jacketed **TILTING PANS,** 60 gallons capacity and for 40 lb. working pressure.

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2,000 and 1,000 gal. Aluminium **VEHICLE TANKS.**
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Two—Jacketed **"U"-TROUGH "PORTEUS" MIXERS,** 6 ft. 3 in. by 2 ft. 3 in. by 2 ft. 7 in.

PUMPS, HYDROS, STILLS, CYLIND ICAL JACKETED MIXERS, OVENS, DRYERS.

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20/30 Tons **CHILEAN NITRATE OF SODA.**

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No. 3 **KEK MILL,** comprising M.S. galvanised bin 48 in. diam. by 29 in. deep, tapering to two 8 in. diam. outlets. Grinding chamber 18 in. diam. Underdriven through enclosed gearing with bare shaft extension. Suitable for grinding fibrous materials.

Unused Vertical **MIXER** by Brierley, Collier, with stainless steel lined pan 18 in. diam. by 10 in. deep, jacketed 15 lb. w.p., with spiral-type agitator. Fast and loose pulley drive.

500 gal. **C.I. MIXING VESSELS,** 5 ft. diam. by 5 ft. deep. Anchor-type agitator, driven through bevel gears, and fast and loose pulleys.

Two **VERTICAL MIXERS,** 3 ft. 6 in. diam. by 2 ft. 6 in. deep, of ⅜ in. mild steel plate Twin underdriven scraper agitators. Hinged cover with 12 in. diam. feed. Bottom side 5 in. diam. outlet. Motorised 400/3/50.

Three Peerless **MIXERS,** 80-qt. capacity, fitted integral motor, 400/3/50, with various whisks and beaters.

M.S. Lead-lined **MIXER,** 2 ft. 3 in. i.d. by 3 ft. deep, with 12 in. cone bottom, 2 in. flanged bottom outlet. Vessel totally enclosed, lead-covered paddle type agitator. Motorised 400/3/50.

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TWO PERPLEX" GRINDING MILLS, each driven by 7½ h.p. A.C. motor.

One **DITTO** without motor.

JACKETED MIXER, double Z-arem beaters, tipping pan 20 × 20 × 17, belt drive.

VACUUM FAN on motor bedplate, 3 in. intake.

WORTHINGTON DUPLEX PUMP, 5¼ × 3½ by 5-stroke.

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STAINLESS STEEL CRYSTAL DRIER by **MITCHELL,** 3 ft. 6 in. diam. by 1 ft. 6 in. deep. ***STEAM JACKETED*** *flat bottom with two S.S. paddles underdriven through bevel gearing from direct-coupled 1 h.p. 400/3/50 geared motor. Jacket working pressure, 15 lb per square inch.*

M.S. SPIRIT EXTRACTION PLANT, comprising 3 ft. diam. by 5 ft. deep extractor with dished bottom jacketed for 5 lb. per square inch working pressure, condenser, separator, storage tank.

KESTNER HORIZONTAL TUBULAR EVAPORATOR, having six turns copper tube 1½ in. bore by 6 ft. long, complete with copper reception pot.

STEAM JACKETED COPPER STILLS, 150 gallons capacity. Fitted swan-neck, sight and light glasses, etc., and complete with copper coil condenser. Jacket working pressure 40 lb. per square inch.

STEAM JACKETED COPPER BOILING PAN, 100 gallons capacity. Bolted-on cast-iron jacket suitable for 40 lb. per square inch working pressure.

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M.S. HORIZONTAL " U " TROUGH MIXER, 3 ft. by 1 ft. 9 in. by 2 ft. deep. Fin-type agitating gear belt driven through helical gearing from fast and loose pulleys. Arranged for hand tilting.

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JACKETED PANS in stainless steel or mild steel, with or without mixing gear.

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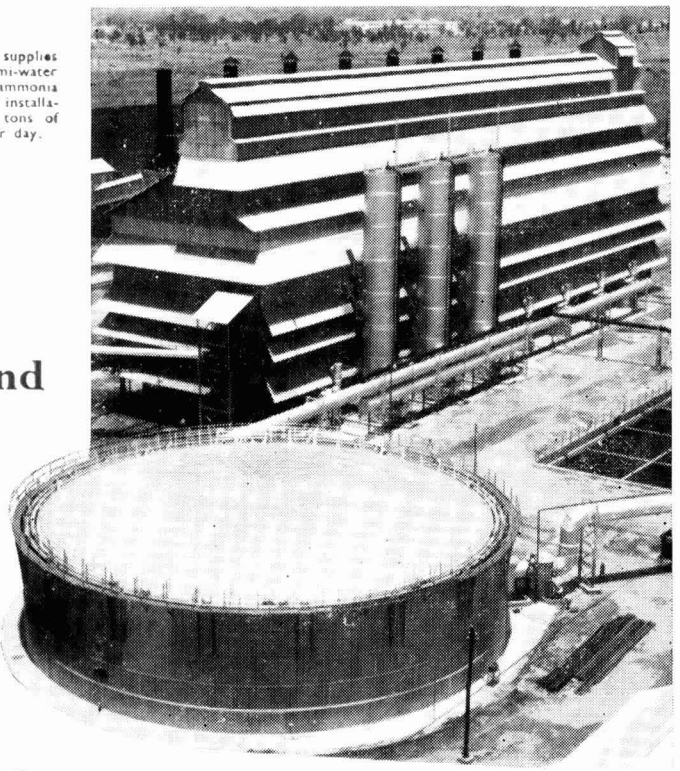

INDIA. This plant supplies 33,000,000 cubic feet semi-water gas per day for ammonia synthesis in a fertiliser installation producing 1,000 tons of ammonium sulphate per day.

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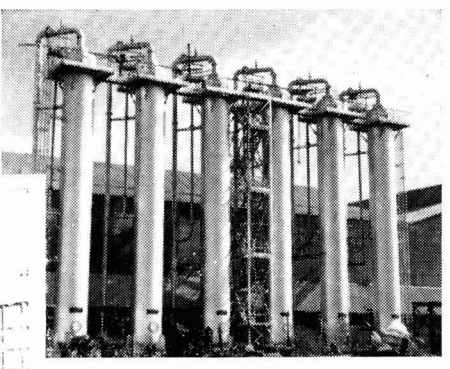

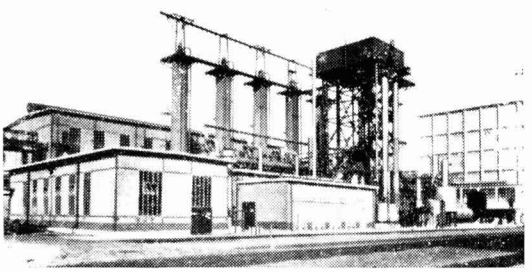

INDIA. Six carbon dioxide scrubber towers 75 feet high wash a stream of gas under a pressure of about 300 lbs. per sq. inch.

HOLLAND. A general view of a plant for the production of ammonia synthesis gas. Designed capacity 18,000,000 cubic feet per day.

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