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# The Chemical Age

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## CONTENTS 30 JULY 1955



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# Exports to Europe

'DURING the past five years there has been a phenomenal increase in the imports of the Western European countries, yet the lion's share of this extra trade has gone to Germany. Whereas our own exports to these countries increased by £104,000,000 between 1951 and 1954, German exports rose by £400,000,000.' This quotation is taken from an excellent survey of the Western Europe market recently published by The Credit Insurance Association Ltd. (of Staple Hall, Stone House Court, Bishopsgate, London E.C.3). It is more than a plain statement of fact. It is a question and a challenge. Should British manufacturers assume that Europe is a natural market for German exports and be content or complacent about it? It is true that much of Germany's rapidly increased output has been absorbed by the similarly expanding European market, and as a result we have experienced less competition than might have been expected in our own export markets, the Commonwealth and North America. It is not true, however, that our normal share of Western European trade is insignificant; if we do not share also in the present expansion in that trade we may well lose the prestige and goodwill that exists.

Figures for 1954 show that Western Europe took 28 per cent of all British exports. This was about two-thirds of our exports to non-Commonwealth countries. Disregarding currency aspects of overseas trade, our sales to Europe are more important than our sales to the United States. In 1954 a 7 per cent increase in world trade was recorded by a United Nations survey (*World Economic Report*, 1953-54). But most of this world increase in trade was in fact accounted for by the rising activity and demand of industrial countries in Western Europe. 'There is a new spirit in Western Europe; after years of economic stagnation, the old mood of pessimism has been cast aside and the area is now expanding with a vigour almost equal to that of the New World.'

The OEEC group as a whole obtains about 10 per cent of its imports from the United Kingdom, but this overall figure is the kind of fact that makes a bad pointer. Country by country the proportion varies greatly. Ireland, 60 per cent; Denmark, over 25 per cent; Western Germany, under 5 per cent. The high proportion of Ireland is explained by geography, but the other variations are not as easily explained. There are, of course, explanations of a broad nature. British order-books have been kept fairly full, if not often overfull, by Commonwealth trade demands. Full employment here makes it difficult to produce extra output for export sales expansion. In the earlier post-war years a network of currency problems and trade restrictions discouraged many

British exporters from making energetic efforts to obtain orders in Europe; there is no doubt something of a hangover from this period still making trade with Europe unattractive as a determined aim. German exporters themselves originally held this view, but have now made 'a drastic re-assessment of the future value of the European market'.

It would appear that exports of chemicals to Western Europe are making a particularly commendable expansion. On the one hand, the market for durable goods is offering more scope for increased sales than the market for consumer goods; yet on the other, chemicals, largely to be classed as non-durable, are being increasingly sold to OEEC countries. In 1952 OEEC countries took 21 per cent of Britain's total chemical exports; this figure rose to 26 per cent in 1953 and 25 per cent in 1954; iron and steel, non-ferrous metals, cotton goods, and road and air vehicles are the only other major classes of exports which can show similar expansions. However, this method of comparison is unrealistic for Britain's total exports of chemicals to *all* countries have been rising in the same period. 21 per cent of 1952's total has a different base from 26 per cent of 1954's total, and the real expansion is from about £37,000,000 per annum to £50,800,000. Judged in real terms, no other class of exports has made such a notable increase in its sales to Europe; indeed, for some classes the increased proportion of trade with Europe is simply a reflection of the fact that trade with the rest of the world has fallen. However, it must be noted that figures for the first quarter of 1955 showed a slowing-up in this 1951-1953 trend for the European slice in our chemical exports to continue growing.

The markets in Germany and Italy are probably the most likely to be responsive. Many British producers are diffident about exploring the German market, largely because it involves trying to sell goods to the principal competitor for other countries' trade on his own doorstep. Nevertheless, German tariffs have been substantially reduced in recent years, an official policy deliberately aimed at keeping internal prices as low as possible. The Italian market, though it varies sharply from district to district, is particularly expansive. Credit requirements may be longer-term than for other overseas trade; nor is trade likely to be won unless the price asked is competitively low. Despite these two qualifications the opportunity is still said to be a good one. Austria is a much neglected market. Austria, having regained independence, is ready to rely rather less upon Germany for her import needs. In three years (1951 to 1954) German exports to Italy rose by £57,000,000: British exports to Italy rose by just under £24,000,000. Similarly, German exports to Austria rose by nearly £47,000,000 while our exports rose by only £500,000.

There is a general willingness to buy British goods; where there is apathy or indifference it seems to exist far more on our side than in Europe. It is said that we fail to study individual European markets at all thoroughly, that we do not appoint enough agents nor back the agents we have with enough information and sales literature, that we advertise much less than Germany, that far too few British firms are directly represented at Europe's trade fairs. Certainly this final point is confirmed by quite recent discussions in these pages! Payment terms required by British exporters are often inadequate for European buyers; it is often disputed that Germany regularly offers longer credit terms, but the German export finance organisation, which is concerned only with credit periods of six months or more, was heavily committed with European countries at the end of 1954. Delivery dates also place British manufacturers at some disadvantage in otherwise promising markets; this, no doubt, can often be attributed to the fact that our main market is still elsewhere.

There is an often underestimated disadvantage for British sellers in Europe, one that at any rate operates for many types of goods—we do not use the metric system. This matters little enough if we accept the position that we, as the odd-nation-out, must do the converting, including the not inconsiderable matter of unit-sizes for packing. It matters far more and in an adverse direction if we adopt a 'take-it-or-leave-it' attitude.

# Notes & Comments

## Differential for Skill?

THE shortage of scientific personnel and the vexed question of pay differentials for skilled workers are two of the most frequently discussed topics of our time. A recent advertisement from one of the Ministries so boldly ignores the existence of both these problems that we are provoked into angry comment. Four assistant technical officers were required, their work to involve travelling; also, their duties would be connected with a fundamental application of science to this country's productivity, an application that for some years has suffered from serious inattention. The qualifications specified in the advertisement were a degree and one year's experience in business or in the industry concerned. The salaries offered bore no relation to the importance of the work or to the training apparently needed. For men, a London starting salary would be £440 at age 21 to £536 at age 25. In case any applicant should carelessly assume that these salary figures were simply a basis for discussion, open to upward adjustment for really suitable experience and qualifications, it was swiftly stated in addition that salaries would *be lower in the provinces and for women!*

## Even Security Lacking!

PERHAPS the London starting salary of £440 at 21 can be ignored. It must sometimes be the fate of youth to endure a small reward for the sake of a promising opportunity. In any case, it seems unlikely that any young man of 21 today would have had time to acquire a degree and carry out his National Service obligations and also to have acquired one year's experience in industry or business. But £536 at the age of 25—and less outside London! £10 6s. 2d. per week, and for a post that is classified as 'temporary' and therefore lacks even the old virtue of government employment, security. Finding the differential for years of study and the acquirement of specialised knowledge might well be referred to one of the BBC's problem-quiz programmes. Any doubts that this evaluation of scientific attainment truly represents official policy seem to be made smaller by the final fact in the advertisement, that application forms were to be obtained from the Ministry of Labour's Technical and Scientific Register. At least two Ministries are therefore associated with this estimate of a graduate's market value.

## No Incentive

THERE may be some taxpayers who think this attempt to seek economy is commendable, but this is a superficial and short-sighted view when the nation's future rests so heavily upon technical efficiency. Can it possibly be hoped that first-class people of the required kind will be attracted by a salary scale that compares unfavourably with many semi-skilled wage rates? If most employers offered similarly poor salary scales for a degree plus experience, how many young people would have an incentive to study for a technical degree? Certainly one point can be admitted—the Ministries concerned are doing all they can in this matter to check inflation!

## US Paint Developments

WATER emulsion paints that are fast-drying and almost odourless have built up a sales level in US of more than 40,000,000 gallons per year. Most of this rapid boom was based upon rubber latex as the emulsion resin. Now the latex-based paints are having to face ever-increasing competition from solvent paints based on odourless alkyds and water-thinned paints that use acrylic or polyvinyl acetate resins instead of latex. Nothing seems to cause more trouble than roaring success, and the imitators of the latex formulations seem likely to take a sizeable share of a market that has only just been pioneered. Certain limitations of the latex-based

emulsions have left the door open for competition from new products. Hard water has had to be avoided; so have calcium sulphate pigments. The paint film after application has tended to yellow and become brittle and its initial washability has often been rather poor. The emulsions have had poor stability in severely cold weather. Although some of these drawbacks can be overcome by careful formulation, the manufacturing technique required for latex water emulsion paints is very rigorous in its simplest form; extra refinements in processing have added considerably to costs.

## *Numerous Advantages*

WATER-THINNED emulsions built on acrylic or polyvinyl acetate resins retain whiteness or colour much more effectively even in unfavourable conditions. They dry rapidly, acrylics within less than an hour, PVAcs within two hours. They are almost odourless and in any case possess a 'non-paint' trace-odour that quickly vanishes. Acrylics are as safely water-washable as gloss enamels; PVA emulsions develop a safe washability within a week of application. There seems little doubt that the acrylic resins are the best formulation bases for these modern water emulsion paints for their all-round performance has no weaknesses that must be safeguarded by special preparation or precautionary instructions. They are handicapped by only one fact—they are dearer. Sales have to be won with a premium price; on the other hand, the actual materials cost in painting is relatively small compared with the labour cost and the value of the time re-painting takes in, say, an office or hotel. Sales of acrylic emulsion paints are expanding steadily, and if a large enough growth-rate is achieved the costs of acrylic resins for formulation may fall by enough to narrow the premium.

## *New Versatile Nickel Alloy*

NIONEL is the name of a new high nickel content alloy developed by International Nickel at their Bayonne Research Laboratory (*Chemical Engineering*, 1955, **62**, 7, 256). Its versatile resistance to acid corrosion seems likely to attract wide interest in the chemical industry. The nickel content is approximately 40 per cent; with 3 per cent molybdenum, 21 per cent chromium, 31 per cent iron, 1.75 per cent copper, and traces of manganese, silicon, and carbon. Nionel's resistance to most hot acid solutions is appreciably greater than that of most stainless steels. It resists 70 per cent sulphuric acid at 176° Fahr. and 40 per cent sulphuric acid at boiling temperatures; it is resistant to nitric acid at almost all strengths and temperatures. Its resistance to hot phosphoric acid solutions is high and the alloy may find its most promising market in plant for producing this acid from phosphate rock. Pitting corrosion from sea-water is withstood; and resistance to oxidising substances and organic acids is also stated to be high. This attractive range of anti-corrosion properties is not handicapped by poor mechanical qualities. Nionel is said to be tough and weldable and producible in all standard mill forms, as plate, rod, or tubing.

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## *Road Surfacing*

FORCEFUL claims for the Valltar double and triple coat road surfacing processes are made by the inventor, F. W. Valle-Jones, A.M.Inst.C.E., in a paper, 'The History of the Non-Skid Road Surface and Other Aspects of Road Surfacing'.

The whole tone of the paper is controversial and the author does not hesitate to back his claims by quoting what he believes to be examples of prejudice by many important organisations connected with the construction and maintenance of roads.

The Valltar processes, says Mr. Valle-Jones, had a serious setback when they were copied by the Ministry of Transport and the British Road Tar Association who used a process called double surface dressing.

Mr. Valle-Jones is critical of the present road policy as typified by DSIR's Road Research Laboratory. 'The chief fault I find . . . is the repetition of experimental trials with processes which have definitely proved failures'.

This paper is the first of a series. The next will deal with typical asphalt paving mixtures and how they are built up, penetration and grouting work, and surface dressing.

# Prosperity in Western Europe

## Chemical Industry Booming

THE thriving industry, booming stock markets and rising standards of living in western Europe have far exceeded the relative prosperity of the United States, declared Dr. Robert S. Aries, New York consulting engineer and economist, who has just returned from a three-month western European trip. The relative boom in western Europe, taking any post-war year as a base, exceeds its US equivalent. The difference is particularly noticeable since 1951 when many sections such as textiles in the US operated at record levels which have hardly been equalled since. Western Europe had an uninterrupted post-war boom and industrial production showed an increase of five per cent in 1953; nine per cent in 1954 and an estimated five per cent in the first six months of 1955.

Dr. Aries, a chemical engineer, is president of R. S. Aries & Associates, a consulting firm with activities throughout the free world. He declared that the US chemical industry has always been referred to as a 'growth' industry. It has grown at the rate of 7.5 per cent since 1951, which is less than half the growth of the European chemical industry since 1951, whose average growth has exceeded 15 per cent per year. The spectacular growth of some companies within the industry has been unequalled by any chemical Horatio Alger stories in the US. For example, the French company Consortium de Produits Chimiques et de Synthese whose sales this year should be 5,000,000,000 francs sold only half as much in 1954 and half again as much in 1953.

### Expansion of Marchon Products

In England Marchon Products Company has grown in 10 years from a company with £20,000 capital to one with about £10,000,000 capital. In Germany new names such as Rhein Chemie and Hibernia are making vast strides. There is hardly a small company in the US that has equalled at any time the growth performance of the above. The giants are also becoming bigger, with Montecatini dominating the Italian chemical picture, Imperial Chemical Industries in England, Bayer, BASF and Hoechst in Germany, Rhone Poulens and Pechiney in France.

The fear of major fluctuations in the US which haunted European businessmen has lessened and the feeling of economic good health is in evidence. Multi-million dollar projects are as easy to discuss as small ones, a state of mind difficult to see a few years ago. Western Europe now has a healthy trade balance of exports over imports, which will permit more dollar goods to come in the future. Currencies are sound and prices are stable, not because of controls (as until recently), but because of genuine market forces.

### A Single Cloud

The only cloud on the horizon—barring a war—is the shortage of labour which is already beginning to affect some countries, such as England. The spectre of full employment is feared as much as that of unemployment, declared Dr. Aries. The birthrate in France is the highest in Europe and no other nation has a lower unemployment rate. Thirteen per cent of her income now goes into investments as compared to three per cent in 1938. Instead of worrying about austerity, the British are worrying about prosperity whose pressure is sending prices up.

Dr. Aries, who has visited Europe at least once a year since the end of the war, declared that no one in the wildest speculation could have visualised the rapidity of the German recovery from the appalling ruins of 1946. West Germany is producing more and living better than ever in her history. For example one can now dial direct to any telephone number in about 20 cities. The armament programme will probably interfere somewhat with this vast civilian expansion.

What kept Europe free despite the chaos, anarchy and communism of the end of the war? According to Dr. Aries the reasons have been that incalculable human endeavour of the Europeans, the $23,000,000,000 of US aid in the form of grants and credits, and particularly the 'private point four' programme of US manufacturers. This little publicised US aid has been doubly important as it has developed intimate relationships between US industries and consultants and European manufacturers, and eventually the flow of 'know-how' into the

US should equal the outgo. The licensing of processes and complete 'know-how' from the US has been a prime contributor to European recovery as it has permitted saving of valuable time and the use of most efficient processes. In the chemical processing industries alone this 'private point four' programme is estimated by Dr. Aries to result in products with annual sales of over $1,000,000,000 on the part of Western European industry. Private initiative thus has been the largest single factor in industrial recovery and progress.

## Home Office Notice

### Pharmacy and Poisons Act 1933

STATUTORY Instruments giving effect to recommendations made to the Secretary of State by the Poisons Board are being prepared. It is proposed to make the following changes in the poisons list and rules.

1. Sulpha drugs, in preparations for the treatment of *coccidiosis* in poultry, will be exempted from the requirements applying to fourth schedule poisons.

2. 6-Mercaptopurine will be added to part I of the poisons list and the first and fourth schedules to the poisons rules.

3. Methylpentynol will be added to part I of the poisons list and the first schedule to the poisons rules.

4. The entry colchicine in part I of the poisons list will be amended to colchicum; alkaloids of, and, in the first schedule to the poisons rules to: colchicum; alkaloids of, except substances containing less than 0.5 per cent of colchicine.

5. Methyldesomorphine, diacetyl-N-allylnormorphine, and 6-piperido-4:4-diphenylheptan-3-one, will be added to part I of the poisons list, and the first schedule to the poisons rules.

6. The entry sulphotepp in part II of the poisons list, the first, fifth, eighth and ninth schedules to and rule 14(2)(b) of the poisons rules, will be amended to sulfotepp.

7. Demeton-o, demeton-s and mazidox will be added to part II of the poisons list, the first, fifth, eighth and ninth schedules to and rule 14(2)(b) of the poisons rules.

8. Methyl Demeton-o, and methyl demeton-s, will be added to part II of the poisons list and the first, eighth and ninth schedules to the poisons rules.

9. The entry of amino-alcohols in part I of the poisons list and the first schedule to the poison rules will be amended to include the salts of these substances.

10. The amphetamines, *beta*-aminopropylbenzene, etc., will be added to the list of substances included in the fourth schedule to the poisons rules, and deleted from the seventh schedule.

11. Substances containing disulfiram, other than preparations for the treatment of human ailments, will be exempted from the requirements of the pharmacy and poisons act, and the poisons rules.

12. Preparations containing less than 1.5 per cent of dextromethorphan will be exempted from the requirements applying to first schedule poisons.

13. Solid nicotine preparations containing less than four per cent of the nicotine will be exempted from the in transit labelling requirements applied to the substances included in the eighth schedule to the poisons rules.

14. The ribbing requirements laid down in Rule 23 of the poisons rules will be extended to include bottles made of materials other than glass.

## Exemptions from Duty

THE TREASURY have made an Order under Section 10(5) of the Finance Act, 1926, exempting the following articles from Key Industry Duty for the period beginning 25 July, 1955, and ending 18 August, 1955:—

Goods containing dutiable parts or ingredients, the following:—

Scrap exposed X-ray film which is dutiable only by reason of containing cellulose acetate as an ingredient.

Synthetic organic chemicals analytical reagents, other fine chemicals and chemicals manufactured by fermentation processes, the following:—*o*-Cresol, nickel sulphate (a nickel compound), d-Pantothenyl alcohol, Tetrachlorophthalic anhydride (a chlorophthalic anhydride), Tetraisopropyl orthotitanate (a propyl ester).

This Order is the Safeguarding of Industries (Exemption) No. 5 Order, 1955, and is published as Statutory Instruments 1955 No. 1063. Copies of the Order may be obtained (price 2d. net, by post 3½d.) from HM Stationery Office, Kingsway, London W.C.2, and branches or through any bookseller.

# Duke of Edinburgh's Study Conference

## Theme to be Human Aspects of Industrialisation

THE theme of HRH The Duke of Edinburgh's Study Conference on the Human Problems of Industrial Communities within the Commonwealth and Empire, to be held 9 to 27 July next year at Oxford, will revolve around the human aspects of industrialisation. The conference is the result of a meeting between 50 industrialists and trade unionists and The Duke of Edinburgh who heard their advice about a suggestion to hold a study conference dealing with the human problems of industrial communities. This meeting was in July, 1954. In December a second meeting evolved into a conference council and the Duke consented to become president of the conference to be held in Oxford.

In a foreword in the outline programme of the conference which has just been circulated, the Duke of Edinburgh says: 'I cannot emphasise too strongly that this is a study conference not for research workers, but for young people actually engaged in industry. Its main value will not lie in the report of the speeches and discussions. Its value will depend upon what the members make of what they see and hear. Its value will lie in the ability of the members to describe their points of view and experience for the benefit of others and their ability to distinguish what is likely to be useful in their own special cases.'

### Industrial VIPs on Council

Many heads of industry are members of the conference council, among them Sir Geoffrey Heyworth, chairman of Unilever Ltd., Sir Alexander Fleck, chairman, Imperial Chemical Industries, Sir Harry Pilkington, chairman, Pilkington Brothers Ltd., Sir Frederick Godber, chairman of Shell Petroleum Co. Ltd., Lord Baillieu, chairman, Dunlop Rubber Co. Ltd., and Mr. Fraser W. Bruce, managing director of Northern Aluminium Co. Ltd.

The work of the conference will be based on documents previously circulated, plenary sessions, study group discussions and the experience of the study tours. Documents dealing with the main subjects of the conference will be sent out in March.

The study groups will consist of 14 members, chosen to represent a wide range of industrial experience in different countries. Each group will have a chairman from Britain and the group will remain as a body throughout the conference and will submit reports.

On the study tours each group will spend nine days independent of other groups. About half the time will be spent in provincial centres in England, Scotland or Wales; the rest of the time in London. They will study under working conditions some of the problems discussed at Oxford.

### Overseas Visitors

Overseas visitors who will speak at the conference will include Mr. William John Bennett, O.B.E., LL.D., director and president of Atomic Energy of Canada Limited, and managing director and president of Eldorado Mining & Refining Limited, Mr. Robert Kweka Atta Gardiner, chairman of the council of Kumasi College of Technology, and Mr. J. R. D. Tata, chairman of the Tata Industries Ltd., of India.

As a study conference, success will depend on the quality and interest of contributions from those attending; membership is to be composed of men and women of the Commonwealth and Empire broadly within the age group of 25 to 45 who are engaged in the managerial, technique and operative roles of industry.

In describing the purpose of the conference the outline programme says: 'Today there are within the Commonwealth and the Empire communities at all stages of industrial development. Some, indeed, are feeling the first clash of new techniques and social groupings against older ways of life, work and belief. Here the difficulties, perhaps emphasised by speed of change, racial tensions, or population growth, may seem more obvious. But countries older in industrial history, much as they may contribute from experience, have problems, less obvious, but perhaps more deeply rooted. Further, on all falls the impact of progress in nuclear physics, electronic control, biology and chemical engineering which

are making a new industrial revolution in developed countries and will influence the development of others.

## Tube Cleaning Process

### Uses Flame Equipment

A NEW method of cleaning the insides of tubes is indicated by a report on maintenance work carried out recently at the Prince Regent Tar Company. The tubes involved in this particular job were still tubes used in the coal tar distillation process. In service these tend to become fouled by deposits of bitumen, and normally cleaning is a tedious job undertaken with a mechanical drill and scraper. In some cases it may take a full day to clear one tube.

The new method which was tried out with complete success reduced cleaning time from one day to 30 minutes. The apparatus was an adaption of British Oxygen's flame cleaning equipment. The still tubes in question were cast iron, 15 ft. in length and 2 in. bore, and a simple burner was designed with integral fins, which besides spacing the burner from the wall of the tube, acted to some extent as scrapers, This fitted into the bore so that the whole length of the tube could be traversed internally.

During earlier attempts to burn out the residue, too much heat was applied to the casting, but it was noted that at one stage of the proceedings the gummy bitumen turned into a form of powdery coke and that this material was easily removed by scraping.

In view of this, the burner which was constructed had only a few 1/16 in. holes drilled into it for gas nozzles and these were sufficient to bring about the required conditions. The assembly was attached to an ordinary piece of lance tubing through which the gases were supplied and it was then possible to push the assembly progressively through all the obstructions.

Alternate passes with this burner and a scraper proved adequate to remove all deposits.

Although no excess of heat is applied to the pipe being cleaned, the burner itself attains a red heat in a very short time and must, therefore, be constructed in stainless steel. It is also necessary to use a short length of stainless steel tube between the burner and the lance pipe otherwise its life is very short.

## Metal Protection

### New Refractory Oxide Coating Method

PROTECTION of metal parts against extreme temperatures is possible using a method developed by the Norton Company of Worcester, Mass. Highly refractory crystalline oxides are deposited as a fine spray on the surface of the component, offering protection from erosion and providing thermal insulation.

Previous ceramic coatings were found to be effective only up to about 1,000° C but research and development into jet and rocket propulsion required surfaces that would stand up to temperatures of 1,700° C and above and a method was developed for depositing aluminium oxide directly on to a metal surface.

Finely powdered alumina is mixed with water and an organic material such as cornstarch. The product is then extruded to form rods 24 in. long and $\frac{1}{8}$ in. diameter, which are then baked in a kiln. This method can also be applied to zirconium oxide, titanium oxide, magnesium aluminate, iron oxide, zirconium silicate and chromium oxide.

Thermal expansion, thermal conductivities, and densities are lower for oxides than for steel and melting points and hardnesses are higher. These coatings are therefore an improvement over bare steel for resisting the corrosion and erosion of combustion gases.

Coatings may be applied to practically any material but their most common use is for the protection of metals. Application is mainly by spray and these coatings have been used on rocket and guided missiles, ram jets, gas turbines and miscellaneous burner parts.

A silicon carbide coating for graphite has also been developed by this company. Surface hardness is increased by 300 to 400 per cent.

### To Meet Demands for Soda Ash

Brunner Mond Canada Ltd. announces plans to expand the production capacity of soda ash at its plant at Amherstburg, Ontario, to meet increasing demands. Mr. R. W. Atkinson, vice-president stated that the expansion project will start at once and is expected to be completed within eighteen months. The expenditure, involving millions of dollars, is estimated to be adequate for domestic demands.

# Poland's New Chemical Industry

## *Extensive Developments Since the War*

BEFORE the second world war Poland's chemical industry was negligible, acounting as it did for a mere 1 per cent of the world output of the major chemical products.

This backwardness did not reflect any deficiency of essential raw materials. On the contrary, these raw materials exist in plenty. Poland has rich seams of hard coal, including coking and gas coal, which provide the basis for the production of rubber and synthetic fuel, dyes and pharmaceutical goods, plastics and synthetic fibres. Extensive deposits of limestone and salt provide the foundation for manufacture of sodium carbonate, chlorine, etc., and there are in addition rich resources of gypsum, sulphur and anhydrite, pyrites and phosphorites.

The exploitation of these resources has occupied a central position in the plans for economic development put into effect since 1946. By 1949 the industry's output was almost two and a half times what it was in 1938, and the rate of development has increased still further in the period covered by what is known as the Six Year Plan (1950-1955). Over the past five years some 50 new chemical establishments have been opened, and a further 20 are at present under construction.

### $H_2SO_4$ from Anhydrite

Among new factories some outstanding ones may be mentioned. At Wizow in the province of Wroclaw (in the regained territories) there is a large establishment producing sulphuric acid from anhydrite by a method elaborated by Polish scientists. Also in the Wroclaw area there is the cellulose works at Jelenia Góra, as well as a very big nitrogen factory at Kedzierzyn. At Dwory, near Oswiecim, there is a complex of factories producing carbide, acetic acid and synthetic rubber; the equipment of this group has been entirely supplied by the Soviet Union.

At the same time the technical level and the organisation of production have been much improved. The continuous flow system of production is increasingly used, as are catalysers, and good progress has been made in mechanisation and automation. The number of engineers and technicians has risen from 3,000 in 1950 to over 9,000 today.

### Range of Products Expanded

Many new branches of the chemical industry have been established, e.g. synthetic tannin, pharmaceutical products, plastics, reagents, etc. A total of some 500 articles new to Polish production are now being made; they include synthetic petrol, phenol and synthetic methanol, chloromycetin, penicillin, the synthetic fibre 'Steelon', fatty acids, sulphonamides and a good range of new dyes.

*Rates of increase of Production*

1. *In relation to* 1938 (taking 1938 figure as 100).

| | 1938 | 1954 |
|---|---|---|
| Synthetic ammonia | 100 | 260 |
| Sulphuric Acid | 100 | 280 |
| Calcined soda | 100 | 250 |
| Caustic soda | 100 | 300 |
| Gas chlorine | 100 | 150 |
| Carbide | 100 | 250 |
| Nitrogen fertilisers | 100 | 220 |
| Phosphorus fertilisers | 100 | 270 |
| Insecticides | 100 | 1,900 |
| Artificial silk | 100 | 230 |
| Varnish | 100 | 300 |

2. *In relation to* 1949 (taking 1949 figure as 100).

| | 1949 | 1954 |
|---|---|---|
| Synthetic methyl alcohol | 100 | 1,500 |
| Synthetic tannin | 100 | 2,500 |
| Steelon | 100 | 1,700 |

The total output of the Polish chemical industry last year was three times greater than the 1949 overall figure, and seven times greater than the 1938 output.

Plans for the future development of the industry lay particular stress on artificial fertilisers and insecticides for agriculture, and on the mass production of such consumer goods as fibres, rubber products and plastics.

In the application of chemistry to agriculture, Poland has to make up for grave deficiencies in the inter-war years, when the use of artificial fertilisers amounted only to between 6 and 7 kg. per hectare (in pure compounds). Today the figure is around 35 kg. per hectare, but this is considered too low, and it is planned to raise the level by 1960 to 60 kg. (in pure compounds), thus bringing Poland into line with major agricultural countries. Nitrogen factories are to be expanded, as are those producing

phosphorus fertilisers. In the latter connection, the production of sulphuric acid will increase with the exploitation of newly discovered seams of sulphur in south Poland. In Kielce and Lublin (south-east Poland) deposits of phosphorites will be worked to an extent that should make the country largely independent of imported supplies.

The range of artificial fertilisers will be expanded, with concentration on increased production of calcium nitrate and ammonium, granulated superphosphates and double superphosphates. Work on the granulation of cyanamide of lime will be accelerated with a view to the introduction of thermophosphates and phosphorite meal based on the above-mentioned indigenous resources of phosphorites. New factories are being built for the production of Azotox and BHC insecticides.

**Output Has Risen**

The output of the major consumer goods produced by the chemical industry has risen considerably over the last ten years, but not sufficiently to satisfy the requirements of the country. The Polish chemical industry is still far short of turning out the 10,000 or so chemical products useful in daily life that are made today, and the second major line of development is in this direction.

At present the production of artificial fibres covers more than 25 per cent of the requirements of the textile industry, and further expansion of this branch is planned. Dyestuffs production, at present standing at three times the pre-war output, is now said to supply 90 per cent of the needs of home cotton and woollen industry, and to provide some exports. High-grade dyes and dyes for silk textiles are still largely imported, however, and it is intended to expand their home production.

The output of synthetic goods at present falls short of demand, and therefore between 1955 and 1957 there will be an expansion in the production of chlorine. The rubber industry will turn out increased quantities of motor tyres, cycle accessories, sanitary and sports equipment, toys, etc., while in the field of pharmaceutical products streptomycin and auromycin will be manufactured for the first time, and the production of sulphonamides, vitamins, hormones and herb extracts will be expanded.

## *Testing in the Dark*

HOW to test the flatness of photographic plates when these plates can neither be handled or exposed to light was a problem recently tackled by the National Physical Laboratory. The metrology division of the laboratory decided to use air gauging for the measurements.

The plate is supported face downwards on three balls which are outside the picture area. Six jets of air blow upwards against the sensitive plate at a pressure of less than half pound per square inch. Any slight pressure changes caused by irregularities in the surface are shown by changes in water level in six vertical glass tubes.

The magnification of the apparatus is 2,500 and the columns are calibrated in microns. To test a plate for flatness the operator places it on the three balls and looks at the level in the tubes. The acceptable limits can be marked in red, so that if any reading is outside the limits the plate may be rejected.

The gauge can be adapted for other flatness tests, or for testing the contours of more complicated shapes by arranging jets at different heights to blow at points where it is required to explore the surface.

The NPL has used air gauging techniques since 1942, and in later years it has developed gauges which will record thicknesses or diameters, internal or external, to accuracies approaching a millionth of an inch.

## *The Chemical Society Fund*

THE Research Fund of The Chemical Society provides grants for the assistance of research in all branches of chemistry. About £700 each year is available; the income being derived from donations by the Worshipful Company of Goldsmiths, from the Perkin Memorial Fund, and other sources.

Applications for grants will be considered next November and should be submitted not later than Tuesday, 15 November. Applications from fellows will receive first consideration.

Application forms together with regulations governing the award of grants may be obtained from the General Secretary, The Chemical Society, Burlington House, Piccadilly, London W.1.

# Separation of Aromatics

## New Methods Used in the US

*by P. W. Sherwood, Research Engineer, New York*

PRODUCTION of benzene, toluene, and the xylenes was originally the sole domain of the coal tar industries. The picture changed radically during the early 1940's when aviation gasoline demands for toluene and xylenes outran the ability of the traditional producer to supply. The petroleum industries filled the breach and during the war years attained predominance in the manufacture of toluene and mixed xylenes. Benzene continued to be derived almost entirely from coal coking operations.

The post-war shortage of benzene called on the petroleum industry to solve the technological difficulties inherent in benzene production and separation, and the first large-scale shipments of synthetic benzene were made in 1949. This time, however, the demand came primarily from the chemical industries, and specifications for benzene were high, calling for new purification techniques. Chief use for benzene is in the manufacture of styrene, phenol, and dodecyl benzene, as well as in the synthesis of a large variety of chemicals in lesser amounts.

The less versatile toluene continues to find its chief markets in aviation gasoline blends, as a solvent in protective coatings, and in the manufacture of TNT. War-time technology for its purification continues to be adequate.

### Separation of Isomeric Xylenes

A very serious problem is encountered in the separation of the three isomeric xylenes. *O*-xylene, needed for phthalic anhydride production can be isolated by distillation. But the separation of *p*- and *m*-xylene defies such an approach, and it is the para-isomer which is needed for the production of terephthalic acid, a raw material for synthetic fibres (Dacron, Terylene) and plastics films (Mylar). Purification of *p*-xylene is to-day accomplished by fractional crystallisation in a process to be discussed below.

All of these lower aromatics have found expanding markets during the post-war years. Their ready availability from petroleum sources was augmented by the wide acceptance of catalytic naphtha reforming processes (platforming, Houdryforming, Hyperforming, etc.), all of which yield a highly aromatic product.

This fortuitous combination makes the petroleum industry to-day the largest supplier of aromatics. US production in 1954 showed the following picture (**1**):

1954 *Production*
(thousands of gallons)

| | *Benzene* | *Toluene* | *Xylenes* |
|---|---|---|---|
| From petroleum .. | 2,000 | 106,000 | 111,000 |
| From coke ovens and other .. .. | 155,000 | 38,000 | 10,000 |
| Total .. .. | 237,000 | 144,000 | 121,000 |
| Per cent from petroleum | 35* | 74 | 91 |

*Up from 23.1 per cent in 1953.

*The Oil and Gas Journal* (**1**) reports no less than 18 petroleum refineries (operated by 16 different companies) which are engaged in the production and/or separation of the lower aromatic hydrocarbons to supply the chemical industries.

When we speak of separation of aromatic hydrocarbons, there are two phases to be considered: (a) removal of aromatics from close-boiling paraffins and naphthenes with which they are associated in the reformate; (b) isolation of the desired compound from associated close-boiling aromatics and/or other hydrocarbons. The present article is concerned with methods which are used, or which show promise, in the achievement of these separations.

Four methods are employed commercially for the separation of aromatics by kind; i.e. their removal from associated aliphatics and naphthalenes. In order of decreasing number of installations, these processes are Udex extraction, extractive and azeotropic distillation, liquid $SO_2$ extraction, and silica gel adsorption (Arosorb process). For the isolation of benzene and toluene, these processes need merely be followed by standard fractional distillation. But for the separation of *p*-xylene, it is necessary to subject the xylenes fraction of the aromatics concentrate to new techniques of fractional crystallisation.

#### 1. *The Udex Extraction Process*

This process was originated by Dow Chemical Company and further developed

by Universal Oil Products Company. It is essentially a counter-current extraction of hydrocarbon fractions with an aqueous solution of diethylene glycol. The affinity of this solvent for hydrocarbons increases with the carbon:hydrogen ratio of the solute. It is therefore particularly suited for application to fairly saturated stocks, such as catalytic reformates in which the group of lower aromatics (B-T-X, an abbreviation for benzene-toluene-xylenes) exhibit the highest carbon content within any boiling point range.

### Applications Widespread

The process is suited for the treatment of charge stocks of fairly wide boiling range, as long as the desired product is in the B-T-X class. There is some overlap in the solubility of different hydrocarbon types, since specificity is determined by C:H ratio rather than by molecular structure. Thus, the Udex solvent exhibits the same solubility for $C_8$ aromatics (xylenes and ethyl benzene) as for $C_7$ cyclo-olefins (e.g. methyl cyclohexene) and for pentadiene. However, these materials are separated subsequently with fair ease by fractional distillation since a wide boiling point spread exists between them. Solubility of toluene and benzene is high enough in the Udex solvent to preclude interference from other compounds which are likely to occur in reformates.

It should be pointed out, however, that the situation becomes more complicated in the recovery of aromatics having more than nine carbon atoms. Here, the presence of saturated alkyl side chains depresses the solubility in aqueous diethylene glycol. Furthermore, there are a number of possible non-aromatic hydrocarbons of like C:H ratio near this range to yield a contaminated extract. This problem may be overcome by choosing a feedstock of fairly close boiling range, at least in the case of reformates. Treatment of cracked naphthas is complicated by the presence of highly unsaturated compounds, such as alkenyl benzenes and polynuclear aromatics. This matter will be briefly considered later.

The heart of the Udex process is a multi-stage extraction column. Depentanised feed enters at an intermediate point and the heavier solvent is fed to the top of the tower. Hydrocarbon reflux is returned to the tower base from a subsequent distillation step.

The raffinate emanates from the top of the extraction column. It is taken to a simple scrubbing column where it is contacted with water for the recovery of dissolved glycols. The wash water is obtained from a later distillation step. After it has performed its scrubbing function, it joins the Udex solvent stream en route to the extraction column.

The aromatics-rich solvent phase leaves the lower part of the extraction column and enters the top of a solvent stripper. Here, contained hydrocarbons and a portion of the water are taken overhead. After phase separation the water rejoins the Udex solvent, after serving as raffinate washing medium, as has been outlined above. The hydrocarbon phase is split into two streams. One of these is recycled as reflux to the extractor. The remainder is taken to clay treating and to final fractionation for isolation of the components of this mixture of aromatics.

The heavy phase of the solvent stripper is recovered diethylene glycol, containing some water. It is diluted to Udex solvent strength by the recovered water plus required make-up.

Jackson *et al.* (2) have reported a typical materials balance for the Udex process unit of Cosden Petroleum Corp. Here, the feed contained 7.6 vol. per cent benzene, 21.5 per cent toluene, 21.0 per cent xylene, 1.9 per cent $C_9$ aromatics, and 48.7 per cent non-aromatics. Aromatics were recovered practically devoid of non-aromatic contaminants (Fenske and Broughton (3) speak of a residual content of less than 0.2 per cent non-aromatics). Recoveries were as follows:

| | |
|---|---|
| Benzene .. .. .. .. | 99.5 per cent |
| Toluene .. .. .. .. | 98.0 ,, |
| Xylenes .. .. .. .. | 95.0 ,, |
| $C_9$ aromatics .. .. .. | 80.0 ,, |

In addition to good selectivity for aromatics (within the limitations discussed above), important properties of the Udex solvent are its excellent chemical stability and non-corrosivity, low solubility in hydrocarbons and low volatility. The last two properties make it possible to operate the process with only low solvent make-up requirements. According to Jackson *et al.*, typical consumption at the Cosden refinery is 0.05 lb. diethylene glycol per barrel product.

In the description of process flow, we have referred to clay treatment of the mixed aromatics, which precedes the final fractionation step. This clay treatment has as

its purpose the improvement of acid wash colour, i.e. the colour which is developed when a sample of benzene, toluene, or xylene is shaken with sulphuric acid under certain conditions, specified by the American Society for Testing Materials. This test is a rough measure of the content of unsaturated compounds.

Traditionally, in the production of coal tar aromatics, specification AWC is attained by washing the product with 93 per cent sulphuric acid. This results in some loss of aromatics. If applied to aromatics derived from reformate, such losses may amount to as much as three per cent. They are eliminated completely, and AWC specication is attained nevertheless, in the clay treatment which is applicable to the petroleum-derived B-T-X fraction. Jackson estimates these treating costs at a mere 0.25 cents per bbl.

### Specifications Met

The benzene and toluene produced at Cosden's Udex unit meet nitration-grade specifications in every way. In the xylene product, nitration-grade specific gravity is purposely avoided; i.e. the product has a higher density than specified by ASTM. The reasons are (a) the high content of *o*-xylene in the reformate. This isomer has the highest specific gravity of the three xylenes. (b) The low paraffin content (0.2 per cent) in the Udex product. This compares with a permissible 4 per cent. Both of these factors result in higher density. Also, both tend to make the product more desirable than nitration-grade xylenes for a number of commercial applications.

The fractional distillation of Udex aromatics into their components calls for great precision. Nitration-grade benzene and toluene have a specified maximum boiling-point range of 1.0° C (ASTM method). This requirement can be satisfied only if the presence of adjacent aromatic hydrocarbons does not exceed 0.1 per cent.

A solution to the problem of providing a fully automatic fractionation system for this service has been offered by Fenske and Broughton (3). For a wide composition range in feed to the benzene column, design was made for minimum reboiler heat load in a column containing 32 theoretical plates. Optimum feedpoint was found to be the sixteenth plate. The eighth plate composition was found to be most sensitive to overhead product (and, therefore, top plate reflux) purity, and this is therefore the ideal place from which to control reflux ratio and reboiler duty. Suitable pressure compensating instruments can also be controlled from this deck. The reader interested in the problem of fractionating Udex product is specifically referred to Fenske's valuable contribution.

We have indicated above that the recovery of aromatics by the Udex process is complicated by the presence of highly unsaturated compounds in the feed, because their high C/H ratio gives them a solubility pattern similar to that of the aromatics. This situation is not encountered to a significant extent in the products of catalytic reforming processes, which are to-day almost the sole starting material for aromatics extraction (only Roosevelt Oil and Refining Corp. uses the product of Platreating as well as a Platformate as feed to Udex extraction).

Because of their very wide availability and interesting potential as source of aromatics, catalytically and thermally cracked naphthas have been given consideration as Udex feed. An evaluation of several such stocks has been reported by Bloch and Wacker (4). It is concluded that Udex extraction of cracked naphthas, followed by clay treating and distillation can yield nitration-grade aromatics only if the content in conjugated dienes (such as 1,3-hexadiene) and alkenyl aromatics (e.g. styrene) is low. If the diene content is high, it is necessary to hydrogenate the feed to the extractor. If alkenyl aromatics content is high and diene content is low, selective hydrogenation is also necessary but it may either precede or follow the extraction stage, as may be more economical. It must be emphasised, however, that this is a problem for the future. For present needs, the availability of satisfactorily saturated reformates for aromatics recovery is adequate.

### 2. *Extractive and Azeotropic Distillation Processes*

Methods in this category were the first means used for commercial isolation of individual aromatic hydrocarbons from petroleum stocks. In 1940, Shell began to separate toluene from hydroformate by extractive distillation with phenol. The process is used to-day by a number of refiners. Toluene separation by azeotropic means has been carried out by Union Oil Co. (using methyl

ethyl ketone as entraining agent) and by Magnolia Petroleum Co., which used methanol. The latter solvent also serves to upgrade benzene concentrated by $SO_2$ extraction and fractionation at Continental Oil Co. (See below).

Both extractive and azeotropic distillations are applied, not to the concentration of aromatic hydrocarbons as such, but to the separation of close-boiling compounds. In both types of process, a solvent is added which is dissimilar from the components to be separated. The result is a deviation from ideal volatility behaviour which tends to spread relative volatility between the key components and thus facilitates their distillous fractionation columns are employed.

### Extractive Distillation

The term 'extractive' distillation is applied if the solvent exhibits a substantially lower volatility than either of the feed components. Feed enters the distillation column at an intermediate point. Solvent is introduced near the top (generally a few plates are provided above the point of solvent entry to permit removal of any volatilised solvent). The light boiler is taken off overhead. The bottoms contain the high-boiling component and the solvent.

By contrast, the added solvent in azeotropic distillation is taken off overhead together with one of the feed components. This makes it necessary that solvents which are to serve as azeotroping agents, boil in the same range as the mixture to be separated. It is, furthermore, necessary that the material form an azeotrope with one of the components. These requirements restrict the number of available useful materials. A wider range of useful solvents is available for extractive distillation.

For reasons of lower heat consumption, extractive distillation is generally to be preferred if there is a substantial amount of overhead product. Azeotropic distillation finds its best application when the feed component to be taken overhead is a small quantity (say 5-10 per cent).

A number of considerations guide the selection of solvent for extractive distillation. On thermodynamic grounds, there is above all its deviation from ideal in mixture with the distillant components. Deviations in volatility and solubility behaviour tend to go hand in hand. It is desirable that a large deviation be shown in volatility but that there be only a single liquid phase at the conditions prevailing on the top plate of the column on which solvent is present.

Of numerous solvents evaluated for the separation of toluene from a close-boiling fraction of hydrocarbons, Dunn *et al.* (**5**) found the optimum improvement in relative volatility exhibited by furfural. However, this compound forms azeotropes with hydrocarbons in the $C_7$-range and is therefore not a satisfactory solvent for extractive distillation of toluene. This, and other considerations in solvent selection (chemical stability, low corrosivity, low cost and good availability, etc.) led to the choice of phenol as ideal for this purpose. This is the solvent employed in the Shell extractive distillation process for toluene recovery. (The use of related cresol has been reported for the separation of benzene from reformate fractions).

In commercial operation, two columns in series form the heart of the extractive distillation process: (a) the toluene recovery unit, in which non-aromatic hydrocarbons are taken overhead while toluene, dissolved in phenol, leaves the bottoms; and (b) the stripper, in which toluene is removed from phenol by standard fractionation.

Performance of a commercial extractive distillation unit of Pan-American Refining Corp. has been reported by Drickamer *et al.* (**6**). The toluene recovery tower had a diameter of 7 feet and contained 65 trays, spaced at 18 in. Hydrocarbon was fed at the 19th tray from the bottom, and phenol at the 39th tray.

### Performance Figures

The feed contained 63.4 per cent toulene. The daily hydrocarbon charge was 1,828 bbls. Phenol was introduced at 4,670 bpd and reflux was taken at 2,500 bpd to obtain 908 bpd overhead and 5,590 bpd bottoms. The bottoms contained 99.4 per cent toluene (solvent-free basis). Actual make-up of this stream was 62.0 per cent phenol, 22.6 per cent sludge, and the remainder was hydrocarbons. The overhead contained 0.2 per cent phenol. Toluene content at this point was 14.3 per cent of hydrocarbons present.

A 30-plate tower suffices for the stripping stage. The bottoms from the toluene recovery tower were fed to the tower's 14th plate. The reflux ratio was held at 1:1. Overhead product assayed 99.94 per cent toluene, and bottoms contained 0.89 per cent toluene, 72.7 per cent phenol, and 26.4 per

[*continued on page 230*

# Indian Newsletter

*FROM OUR OWN CORRESPONDENT*

A NEW ammonium chloride plant, the first of its kind in India, with a capacity of about 8,000 tons per annum has just been commissioned into production at Fertilisers & Chemicals Ltd., Alwaye in South India. The plant costing about Rs.1,000,000 (£75,000) has been designed and supplied by Krebs & Co., Zurich, while the erection and commissioning has been completed by the factory personnel. The principle employed is the straight neutralisation of hydrochloric acid gas with ammonia. Concentrated hydrochloric acid gas of 96 per cent strength derived from by-product chlorine and coming from the adjoining caustic soda plant of the Travancore-Cochin Chemicals Ltd., is diluted to 20 per cent with air, and drawn into saturators where reaction with ammonia gas takes place. Ammonium chloride slurry from the saturators is drawn off periodically and centrifuged. The current requirements of the chemical in India for the dry-cell and other industries are estimated at 4,000-5,000 tons which are derived mainly from imports. The new plant has been designed with sufficient capacity to meet not only the present requirements of the country for ammonium chloride but also future increased demands arising from developments in the consuming industries.

* * *

It is learnt that a final decision has been taken by the Government of India to locate a second DDT factory in India at Alwaye. The first DDT factory near Delhi went into production last year. The chief factor which has weighed with the Government of India for selecting Alwaye for putting up the second DDT factory has been the unique facility that Fertilisers & Chemicals Ltd. offer in supplying oleum and steam and in purchasing back dilute sulphuric acid and dilute hydrochloric acid at reasonable prices. It may also be remembered in this connection that the main consideration for locating the monazite processing plant in the region was the ability of Fertilisers & Chemicals Ltd. to purchase from the Indian Rare Earths Ltd. their dilute caustic lye. The details regarding the set up of the second DDT factory are expected to be released shortly.

A plant for the manufacture of polystyrene moulding powders will be installed by Kilachand Devchand Co. Ltd., in collaboration with Dow Chemical Co., of the United States, who are the largest manufacturers of polystyrene in the world. To this venture, which is claimed to be the first of its kind in Asia, Dow Chemical Co. will contribute 25 per cent of the capital and also provide the necessary technical assistance. Work on the plant will commence shortly and actual production in about a year's time. The plant will have a rated capacity of 6,000,000 pounds of the polymer. In the initial stages manufacture will be confined to polymerising the imported monomer and there is provision for the production of styrene in due course, when the demand for the product increases. It may be remarked here that the Planning Commission has set a target of 4,000 tons of polystyrene under the Second Five Year Plan.

* * *

A new quinine factory has been started in the Anamallais, Madras State, by the Government of Madras in co-operation with the Government of India at a cost. of Rs 3,000,000 (£225,000). The annual production of the new factory is expected to be around 100,000 pounds of quinine sulphate while there is already an older and smaller factory at Naduvattam. Owing to the increased demand for quinine in combating malaria, the cinchona plantations were extended in the state several years back and the plantations now stand at about a total of 9,400 acres in the Nilgiris. The cinchona industry is facing severe competition from synthetic anti-malarials and the production and sale of quinine has become possible only because of state aid. The Pharmaceutical Inquiry Committee which investigated the industry has recommended the manufacture of caffeine from waste tea leaves, and other ancillary commodities to make the operations of the industry more economical. The Government of India has already banned the import of quinine into the country. Recently the Government, on the advice of the Indian Tariff Commission, has granted further protection to the hydro-

quinine industry for a further period of four years. While on the subject of protection, it may also be added that the Government of India has now resolved that protection to the calcium chloride industry need not be continued beyond the close of the calendar year in view of the price structure in this industry.

* * *

A new Ministry of Iron and Steel has been constituted, with Mr. T. T. Krishnamachari as Minister, to deal in a comprehensive manner with the iron and steel projects in the public sector as well as State owned foundries. At present the steel factories proposed in Rourkela and Bhilai are to be set up in collaboration with the German combine of Krupps and Demag and the Soviet Government. A third one has been announced to be set up with the help of British steel interests, most probably to be located in Durgapur in West Bengal. In the same place a coke-oven plant is proposed to be set up at a cost of Rs.55,000,000 (£4,125,000) to handle daily 1,300 tons of coal, and coke breeze. Auxiliary plants for the recovery of ammonia, sulphuric acid, coal tar and crude benzol are to be installed.

* * *

The Government of Andhra have opened a block glass works in Gudur capable of supplying about 300 tons of quality block glass per year. The factory will supply block glass of all colours to meet the needs of the small bead and bangle industry in that State as also in the adjoining States.

* * *

The Government of India on the recommendation of the Higher Power Committee appointed to decide on the location of new fertiliser plants in India have decided to set up a plant at Nangal with an installed capacity of 70,000 tons of nitrogen and 7.5 tons of heavy water per annum. The end product would be ammonium nitrate diluted with clay and chalk in the proportion of 60, 26 and 14 per cent respectively. A unit at Trombay designed to utilise the available refinery gas and produce 140 tons of ammonia per day and 138,000 tons of double salt per year is recommended. Another unit to produce 46,000 tons of urea and 200,000 tons of double salt a year either at the lignite town of Neiveli or at Vijayawada in Andhra is also recommended. One more plant at Itarsi is also contemplated. It is suggested that wherever possible, ammonia synthesis plants should, in future, be associated with new steel plants.

* * *

The western India Section of the Royal Institute of Chemistry (London) in a symposium at Bombay stressed the necessity for the remodelling of chemical education in Indian universities to meet the growing needs of the country and its chemical industry.

## *Separation of Aromatics*

[*continued from page 228*

cent sludge. The presence of sludge necessitates some reworking of the phenol in a separate distillation step.

Both methanol and methyl ethyl ketone (MEK) have served as entrainers in the azeotropic distillation for purification of aromatic hydrocarbons. The application of methanol to azeotropic purification of toluene has been discussed by Benedic (**7**). Its use for upgrading a benzene concentrate is considered in our discussion of $SO_2$ extraction (see below).

Lake (**8**) has investigated azeotroping agents other than methanol and studied the best of these—90 per cent methyl ethyl ketone and 10 per cent water—on a pilot plant scale. With this he obtained complete toluene recovery against 93 per cent possible with methanol. The process has been taken into commercial operation by Union Oil Co. Feed varied from 30 to 85 per cent toluene. Typical ratio of entraining agent to non-toluene components (which are taken overhead) is 2.7-2.9. Reflux ratio is 4:1 to 6:1 (for a column of fifty actual trays). The bottoms contain up to 5 per cent MEK. On a solvent-free basis, the toluene content exceeds 99 per cent.

MEK is recovered from the bottoms by an ancillary distillation. The non-aromatic overhead is freed of MEK by water washing, and the ketone is upgraded to azeotropic strength (90 per cent MEK, 10 per cent water) by distillation. This MEK-water azeotrope is the entraining agent employed for toluene purification.

REFERENCES

(1) *Oil and Gas J.*, 1955, 28 Feb., 74.
(2) Jackson, W. K., *et al.*, *Pet. Proc.*, 1954, Feb., 233.
(3) Fenske, E. R., and Broughton, D. B., *Ind. Eng. Chem.*, 1955, April, 714.
(4) Bloch, H. S., and Wacker, R. C., *Pet. Ref.*, 1955, 34, No. 2, 145.
(5) Dunn, C. L., *Trans. A.I.Ch.E.*, 1945, Oct., 631.
(6) Drickamer, H. G., *ibid.*, 607.
(7) Benedict, M., *et al.*, *Trans. A.I.Ch.E.*, 1945, 25 June, 371.
(8) Lake, G. R., *ibid.*, 327.

(*To be continued*)

# Chemical Exports for June

## *Effects of Dock Strike Felt*

THE results of the dock strike that paralysed most British ports during June played havoc with British chemical exports and figures just released show a marked slump in the value of chemicals exported last month. Australia was the biggest buyer importing £774,132 of British chemicals, but this was less than half the value of imports in the preceding month. India, Canada, New Zealand and the US also bought only one-half the value in chemicals they bought in May from Britain. Exports to the Gold Coast were down to one-fifth.

Of all the principal buyers of British chemicals, only Eire and Pakistan increased their imports. Total value of chemicals exported in June was £11,840,098 as against £21,094,905 in May, and £17,328,830 in June last year.

The value of pharmaceutical and medicinal products exported during June were down by more than £1,000,000 as compared with May, and coal tar exports were down by two-thirds. In May 3,020 tons of aluminium oxide were exported, last month only one ton. In May 682 tons of ammonium nitrate were exported. In June the total was eight tons. There was a marked decrease too, in lead tetra ethyl; 465,973 gal. in May; 38,869 last month.

TABLE 1
VALUE OF EXPORTS IN £ : PRINCIPAL BUYERS OF CHEMICALS

| | June 1955 | May 1955 | June 1954 |
|---|---|---|---|
| Australia | 774,132 | 1,568,354 | 1,385,572 |
| South Africa | 681,244 | 913,653 | 871,164 |
| Pakistan | 673,265 | 260,128 | 582,612 |
| Eire | 629,397 | 570,928 | 621,871 |
| India | 593,178 | 1,355,004 | 1,211,383 |
| Netherlands | 514,947 | 615,154 | 649,495 |
| Italy | 477,450 | 758,599 | 462,060 |
| France | 434,324 | 723,137 | 432,858 |
| Belgium | 399,200 | 468,008 | 321,852 |
| Western Germany | 396,781 | 646,235 | 571,170 |
| Canada | 370,118 | 878,856 | 513,184 |
| United States | 309,251 | 677,587 | 458,409 |
| New Zealand | 294,804 | 757,721 | 630,513 |
| Nigeria | 259,051 | 407,331 | 250,138 |
| Denmark | 232,119 | 388,689 | 233,446 |
| Switzerland | 182,739 | 249,907 | 271,056 |
| Norway | 181,097 | 342,800 | 229,745 |
| Finland | 160,059 | 302,398 | 227,563 |
| Singapore | 152,703 | 396,459 | 307,544 |
| Egypt | 138,218 | 393,312 | 198,568 |
| Argentine | 119,134 | 293,979 | 304,737 |
| Malaya | 116,903 | 314,231 | 240,224 |
| Hong Kong | 102,392 | 363,703 | 286,318 |
| Gold Coast | 62,532 | 323,630 | 278,018 |
| **Total value of chemical exports** | **11,840,098** | **21,094,905** | **17,328,830** |

TABLE 2
EXPORTS : PRINCIPAL COMMODITIES

| | June 1955 | May 1955 | June 1954 |
|---|---|---|---|
| Acids, inorganic (cwt.) | 8,200 | 14,006 | 11,993 |
| Copper sulphate (tons) | 1,240 | 7,381 | 3,621 |
| Sodium hydroxide (cwt.) | 255,097 | 380,257 | 328,071 |
| Sodium carbonate (cwt.) | 154,878 | 51,1853 | 481,563 |
| Aluminium oxide (tons) | 1 | 3,020 | 2 |
| Aluminium sulphate (tons) | 1,324 | 5,035 | 3,336 |
| Ammonia (cwt.) | 3,279 | 9,345 | 4,833 |
| Bismuth compounds (lb.) | 16,196 | 23,886 | 34,751 |
| Bleaching powder (cwt.) | 20,128 | 32,164 | 18,044 |
| Hydrosulphite (cwt.) | 5,433 | 7,474 | 5,747 |
| Calcium compounds, inorganic (cwt.) | 17,921 | 35,111 | 27,039 |
| Lead compounds, inorganic (cwt.) | 3,260 | 5,582 | 5,022 |
| Magnesium compounds (tons) | 1,727 | 1,208 | 1,687 |
| Nickel salts (cwt.) | 6,008 | 6,302 | 5,784 |
| Potassium compounds (cwt.) | 4,607 | 4,435 | 4,612 |
| Acids, organic & derivatives (value in £s) | £39,922 | £68,696 | £63,071 |
| Ethyl, methyl, etc., alcohols (value in £s) | £53,809 | £121,642 | £102,769 |
| Acetone (cwt.) | 4,784 | 11,536 | 6,259 |
| Citric acid (cwt.) | 1,785 | 2,064 | 2,442 |
| Sulphonamides, unprep. (lb.) | 46,102 | 88,301 | 33,139 |
| Dyestuffs intermediates (cwt.) | 3,381 | 5,874 | 8,445 |
| **Total for elements & compounds in £s** | **£2,535,057** | **£5,228,050** | **£4,222,404** |
| Coal tar (tons) | 7,458 | 24,708 | 11,970 |
| Cresylic acid (gal.) | 139,264 | 165,066 | 151,715 |
| Creosote oil (gal.) | 1,855,228 | 2,257,120 | 914,676 |
| **Total for tar products** | **£267,717** | **£468,075** | **£441,112** |
| Indigo, synthetic (cwt.) | 1,308 | 1,506 | 3,825 |
| **Total for synthetic dyestuffs (cwt.)** | **9,720** | **18,297** | **21,956** |
| **Total for paints, pigments & tannins in £s)** | **£1,036,419** | **£1,922,944** | **£1,550,838** |
| **Medicinal and pharmaceutical products, total in £s** | **£1,960,815** | **£2,977,959** | **£2,491,789** |
| Essential oil (lb.) : | | | |
| Natural | 16,343 | 47,615 | 30,864 |
| Synthetic | 81,334 | 117,121 | 63,284 |
| Flavouring essences (value in £s) | 63,192 | £126,404 | £101,113 |
| **Total for essential oils, perfumes, etc. (in £s)** | **£1,279,423** | **£2,312,299** | **£1,763,531** |
| Ammonium nitrate (tons) | 8 | 682 | 372 |
| Ammonium sulphate (tons) | 11,664 | 15,366 | 33,469 |
| **Total for all fertilisers in £s** | **£234,900** | **£348,670** | **£637,320** |

| | | | |
|---|---|---|---|
| Plastics materials, total (cwt.) .. | 95,415 | 152,296 | 113,347 |
| Disinfectants, etc. (cwt.) | 7,323 | 16,701 | 18,504 |
| Insecticides & fungicides (cwt.) .. | 18,330 | 39,764 | 25,438 |
| Rodenticides & weedkillers (cwt.) .. | 2,548 | 11,625 | 7,110 |
| Lead terta-ethyl (gal.) | 328,869 | 465,973 | 437,247 |

## Forecast Favourable

INVESTIGATIONS made by A. Boake, Roberts & Co. (Holding), chemical manufacturers, in order to assess the prospects of the company have given a favourable forecast that demand for their products are likely to remain high. This was said in the statement issued by Mr. F. G. Pentecost, the chairman of the company, at the recent annual general meeting in London.

It is expected that within a short time the company will discontinue the production and sale of sulphur dioxide and some related products upon which the company was based at its inception in 1869. This decision follows investigations into the profitability of certain manufactured and merchanted products which were conducted during the year.

Plans are now being made for the reorganisation of the Stratford factories and development schemes involving new plants at the company's Rainham, Essex, site, while in South Africa they are negotiating for a new site.

Group profits for the year ended 31 March, before deducting tax, have risen to £424,086 as compared with £208,968 for the previous year. The provision for United Kingdom tax based on the year's profits is £223,836 assuming that the directors' final dividend is approved. Out of this year's profits the directors have provided £70,000 against the balance of an income tax liability which was estimated in the preceding year to be about £105,000 against which £30,000 was then provided. The directors have recommended a final dividend of 11 per cent on the ordinary stock, making a total for the year of 15 per cent.

## Plastics Agreement

### Bakelite to Market Polythene

BAKELITE Ltd. have announced the conclusion of an agreement with Union Carbide Ltd. under which Bakelite will market polythene plastics produced in the United Kingdom by Union Carbide. The sales organisation of Bakelite will be available for sales of this polythene both at home and in export markets.

Union Carbide are constructing a plant at Grangemouth in Scotland to produce polythene of the same quality and type as that now made in the US by Union Carbide & Carbon Corporation. The plant is expected to come into operation in the third quarter of 1957, but in the meantime Bakelite will have available quantities of imported polythene.

Polythene is one of the newer plastics materials. It became known to the public through the part played in the development of radar by virtue of its excellent insulation properties at high frequencies. It is still used extensively as an insulating material but its chemical resistance has led to widespread use in the chemical industry for piping, carboys, buckets, funnels, etc.

Bakelite is one of the pioneers in the plastics industry, and has long held a leading place in the field of phenolic resins, moulding materials and laminates of all types, including decorative laminates sold under the trade name Warerite. More recently it completed a new plant to produce resins of the polyvinyl chloride type, to broaden its activities in this field where it was already established as a manufacturer of thermoplastic compounds and sheet. Bakelite is also developing new materials such as polyester and epoxy resins and alkyd moulding material.

## Pulsometer Anniversary

A FEATURE article in the July issue of *Berkshire Life*, a magazine devoted to the county's interests, is about the Pulsometer Engineering Co. Ltd., of Reading, which is celebrating its 80th anniversary.

Founded in 1875 in London, the firm took its name from the revolutionary steam pump called the Pulsometer which it manufactured and was to set the company on a pioneering course in this field to meet the requirements of growing industrial needs.

To-day the Pulsometer Engineering Co. Ltd. has 1,000 employees and 40 per cent of its products are exported. Among them are pumps for oil and sugar refineries, circulating pumps for low and high pressure heating systems, pumps to handle by-product liquids, and stoneware and rubber-lined pumps for handling acids and alkalis.

# HOME

### Moved to Brentford

Corrosion Proof Products Ltd., a firm which specialises in the manufacture and application of chemical resistant materials, have moved to larger offices at Sunley Island, Great West Road, Brentford, Middlesex.

### Cassel Works to be Extended

The I.C.I. main board has sanctioned extensions to be carried out at the Cassel works methyl methacrylate and hydrocyanic plants to meet increasing demands for Perspex.

### Vyner Process

A plant incorporating a new process for degreasing bones, the Vyner process, was opened at the Queenborough, Kent, works of Sheppy Glue & Chemical Works Ltd. on 21 July. This new plant, which was developed entirely by the company, is claimed to be in advance of older processes as regards efficiency and cleanliness.

### Epikote in the Antarctic

A varnish based on Epikote resin made by Shell Chemicals Ltd. is to be used on sledges which are to be taken on an expedition to South Georgia. Shell experts hope in this way to be able to study the effects of extremes of temperature and climatic conditions on this material.

### Joint Conference

A joint conference of The Institution of Chemical Engineers and The Society of Instrument Technology will be held in the Grand Hall, Caxton Hall, Westminster, London, on 4 October. The conference will cover many aspects of automatic control in relation to the design and operation of process plant. Details of the programme and a synopsis of papers to be read will be published in THE CHEMICAL AGE next week.

### New Printing Ink Society to be Formed

At a recent meeting of printing ink manufacturers at the Waldorf Hotel, London, it was decided to form an organisation to be known as The Society of British Printing Ink Manufacturers. The new society which will become operative on 1 January next year will include the members of both the British Printing Ink Association and the British Printing Ink Federation which are to be dissolved.

### To be Exhibited at Geneva

One of the Analmatic automatic laboratories exhibited at the recent British Instrument Industries Exhibition at Earls Court, London, will be displayed on the United Kingdom Atomic Energy Authority stand at the Geneva Atomic Energy Conference in August. Designed and built by Baird & Tatlock in co-operation with A.E.R.E., Harwell, the instrument is used for the continuous analysis of liquors containing uranium.

### Giant Forging Press

A 2,000-ton, 4-column press has been installed at the Renfrew works of Babcock & Wilcox Ltd. to assist in the production of boiler drums. Previously the ends of steam drums have been pressed in the forge and machined in the main machine shop. The largest press available for this particular work had been one of 480 tons which involved multi-stage pressing operations for thicker plates. The new press will enable drum ends of any size to be easily handled, and should be of considerable assistance in the programme of atomic power plant.

### Centenary of the Bunsen Burner

One hundred years ago Professor R. W. Bunsen, of Heidelberg, invented the Bunsen burner, one of the most versatile heating appliances in the scientific laboratory. To celebrate this centenary The Science Museum is focusing attention on its collection of Bunsen burners and of other burners which preceded or followed Bunsens in laboratory use. The collection is exhibited in gallery 66 on the top floor of the museum, until 6 p.m., admission free.

### The British Ceramic Society

The British Ceramic Society's annual dinner and dance will be held at the Connaught Rooms, Great Queen Street, Kingsway, London, on 24 November. It has been decided by the council of the society that the section whose turn it is to nominate the president should be responsible for its organisation. This year it falls to the building materials section which has nominated Mr. T. G. W. Boxall, A.C.G.I., B.Sc., A.M.I.C.E., F.I. Ceram, chief technical officer of the London Brick Co. Ltd.

# • OVERSEAS •

### Dow Chemical Expansion

Dow Chemical Co. of Canada are planning to build a $1,000,000 ethanolamine plant at Sarnia, Ontario.

### Cadmium

Cadmium was in over-supply in the US last year for the third successive year. The output of primary metallic cadmium at domestic plants declined three per cent, and production of primary compounds (cadmium content) increased 60 per cent. The consumption of primary cadmium in all forms was estimated 22 per cent below that of 1953.

### Du Pont to Open Montreal Laboratory

Du Pont Company of Canada announce that a new laboratory for testing the performance of transparent films used in Canada's packaging industry will be opened by the company in Montreal in September.

### To Study French & Italian Methods

Olive oil production in Israel has shown a steady gain during the past three seasons; the quantity supplied to processing factories rising from 700 tons in 1952 to 1,500 tons last year. Israel now has about 100 presses, and in order to help improve pressing methods, the Israeli Ministry of Commerce and Industry has sent two experts to France and Italy to study systems employed there.

### Guano Supply for Rhodesian Federation

An island in the Mozambique Channel, Juan de Nova, a French possession, will soon be supplying 20,000 tons of guano a year to farmers in the Rhodesian Federation. This was announced recently by Mr. Q. S. Ford, chairman of a Rhodesian company, which has signed what is believed to be the first big agreement with commercial interests in Madagascar. Before the war, said Mr. Ford, the guano was bought by New Zealand. Its biggest value as a fertiliser, he said, is its phosphate content, and unlike soluble phosphate, is not as liable to fixation in the soil. The new supply will be mixed with bat guano which Mr. Ford's company has been mining for some time, and will be sold with a 22 per cent phosphate content. The first shipment is due to arrive at the end of this month.

### Grant for Chemicals

Part of the $15,000,000 grant allotted to Turkey by The Food & Agricultural Organisation will be used to buy chemical products.

### Norwegian Chemicals for India

According to a recent trade pact signed in New Delhi between Norway and India, chemical pulp, fatty alcohols, calcium carbide, urea formaldehyde and other commodities will be available for export from Norway while India would export shellac, mica, iron and manganese ores.

### Ethanolamine by New Process

Mr. W. P. Gudgeon, president of the Canadian Aniline & Extract Company, announces that the company's expansion plans are being finalised at Hamilton, Ontario. A research programme and engineering data for production of mono-, di- and tri-ethanolamine by a new continuous process has been completed. Other expansion includes a new laboratory and an administration building.

### Butane Contract

The Esso Petroleum Co. and the British Petroleum Co. will supply 60 per cent of the 70,000 tons of butane required each year for the cold rubber process to be used at the synthetic rubber plant to be built in the Ruhr, it was announced at the annual meeting of the Hüls Chemical Works, on 22 July.

### Australian Zircon

Australian exports of zircon during 1954, 36,512 tons, were the highest recorded since 1951. The US has been the biggest buyer, but in 1954 there was a decided swing in the export trade to the UK and the Continent. Zircon is an important raw material in the construction of nuclear reactors.

### Record Rubber Consumption

During the month of June the consumption of synthetic rubber reached a record height in the US. Consumption of synthetic rubber was 80,445 tons compared with 75,760 tons in May and 57,195 tons in June 1954. Consumption of natural rubber was 56,671 tons compared with 54,785 tons for May and 54,253 tons for the same month last year.

# · PERSONAL ·

Dunlop Special Products Ltd. have appointed MR. FRANK G. DELAHOY technical sales representative for the southern area, based at Wembley, and MR. JOHN D. BANKS technical sales director for the northern area, based at Salford. Mr. Delahoy 28, is a former employee of British Cellulose Lacquers Ltd., where he became assistant chief chemist. He holds the City and Guilds certificate in paint and varnish technology. He has been at Fort Dunlop laboratories for the past six months. Mr. Banks, 27, who holds a science honours degree in physical chemistry from Liverpool University, and is an associate of the Royal Institute of Chemistry, worked until the end of 1954 with the British Insulated Callenders' Cables Ltd. in their plastics compounding laboratories. He has also been in the company's laboratories for the past six months. Both Mr. Delahoy and Mr. Banks will be available in their areas immediately for technical discussion on any of the products of the compositions division of Dunlop Special Products Ltd., particularly on polymeric emulsions for the paint, cement, textile and adhesives industries.

MR. N. A. RICHARDSON, B.Sc., A.R.I.C., has been appointed technical adviser to the Association of Tar Distillers in which capacity he will devote much of his time to wood preservation. Mr. Richardson has been a member of the staff of Forest Products Research Laboratory since 1929 and for several years has been in charge of the section dealing with wood preservation. He was secretary of the Wood Preservation Committee at the Empire Wood Conference in 1947, and in 1950 made a tour of the wood preservation industry in the US and Canada.

SIR WILLIAM MCGILVRAY has resigned from the board of National Benzole Holdings. MR. JOSEPH LATHAM has been appointed a director.

MR. TED FLETCHER, M.A., has been appointed deputy director of the European Productivity Agency. Mr. Fletcher who has been in charge of the British T.U.C. production department since its formation in 1950, took his M.A. at Cambridge. An incorporated accountant, he was at one time chairman of a West of England branch of the Transport & General Workers' Union. Between 1948 and 1953 Mr. Fletcher was a member of the Advisory Council of the Department of Scientific & Industrial Research, and chairman of its industrial grants committee.

DR. DONALD PARKINSON, an authority on the reinforcement of rubber with carbon black to resist tyre wear, retires at the end of August from managing compounding research at Dunlop Research Centre, Birmingham. A lecturer in geology at Queen's University, Belfast, Dr. Parkinson joined Dunlop to study compound research in 1925. In 1936 he obtained the degree of D.Sc. from Birmingham University, and two years ago the Institution of the Rubber Industry awarded him the Colwyn Gold Medal for his conspicuous scientific and technical services to the rubber industry. Dunlop also announces that MR. WALTER ALFRED CLARKE has been appointed production development manager at their German factory at Hanau, as from 15 August. Born at Widnes 39 years ago, Mr. Clarke took a science degree in chemistry at Liverpool University in 1938. He joined Rootes Securities Ltd. at Speke in 1938 and remained there until 1945 when Dunlop took over the Speke factory. MR. REAY GEDDES, one of Dunlop's executive directors, has been elected president of the Federation of British Rubber and Allied Manufacturers' Associations.

PROFESSOR J. HEYROVSKY has accepted the presidency of the Polarographic Society and it is hoped that he will deliver an inaugural address in the near future.

MAJOR C. J. P. BALL, who has been chairman and managing director of Magnesium Elektron since the company's formation in 1934, has been succeeded as managing director by DR. C. J. SMITHELS. Major Ball continues as chairman of the company. Another change is that of BRIGADIER A. G. COLE, formerly assistant managing director, who is appointed commercial director.

DR. R. W. HOLLAND has been elected as chairman of the council of the Society of Arts for the ensuing year. Dr. Holland who was called to the bar in 1908, has held a number of educational appointments, including that of principal of Newport, Mon, Technical College.

At the annual general meeting of the Scientific Instrument Manufacturers' Association, MR. C. E. T. CRIDLAND, was re-elected president for a second term of office. Mr. Cridland, M.I.E.E., is chairman and managing director of a group of companies, including Aldis Brothers Ltd., of Birmingham, makers of the Aldis signalling lamp.

MR. WILLIAM C. FOSTER, former deputy secretary of defence and president of the Manufacturing Chemists' Association Inc., will become an executive vice-president of Olin Mathieson Chemical Corporation. Mr. Foster assumes his new duties, with headquarters in the Olin Mathieson New York offices on 1 August.

MR. BRIAN MOORE has been appointed technical sales representative for Quickfit & Quarz Ltd., of Stone (Staffs). Mr. Moore, who was formerly a laboratory technician at Birkbeck College, London University, will cover the south-east of England, East Anglia, and parts of London.

## *Shell Chemical Co., Ltd.*

ON Tuesday it was announced that, in view of the increasingly rapid growth of Shell's chemical activities and to facilitate the execution of plans for further expansion, it has been decided to concentrate all Shell's chemical manufacturing and marketing activities in the UK and Eire in one company, to be called Shell Chemical Co. Ltd.

This company, which has an authorised capital of £10,000,000, will take over the activities of Shell Chemical Manufacturing Co. Ltd. and Shell Chemicals Ltd. These activities include the manufacture and marketing of detergents, solvents, resins and agricultural products, and a wide range of chemical intermediates. Petrochemicals Ltd., which was recently acquired by Shell Chemicals Ltd., will become a wholly owned subsidiary of Shell Chemical Co. Ltd. and will continue its chemical manufacturing and marketing activities as a separate entity.

The board of Shell Chemical Co. Ltd. will be constituted as follows: Chairman, Mr. F. A. C. Guepin; vice-chairman, Mr. W. F. Mitchell; managing director, Mr. L. H. Williams; commercial director and deputy to the managing director, Mr. G. H. W. Cullinan, previously general manager of Shell Chemicals Ltd.; executive director manufacturing, Mr. E. le Q. Herbert, the managing director of 'Shell' Refining & Marketing Co. Ltd. The other directors of the company will be Mr. J. W. Platt, Sir Robert Robinson, O.M., F.R.S., Mr. A. D. Koeleman, Dr. M. A. Matthews and Mr. F. Mackley.

Until further notice the marketing activities carried out by Shell Chemicals Ltd. hitherto and by Petrochemicals Ltd. will continue to be directed from their present addresses.

## *New Salters' Fellow*

ON THE recommendation of the Director, Sir Alfred Egerton, F.R.S., the Court of the Salters' Company has elected Mr. M. J. Stephen to be a Salters' Fellow for the year 1955-56. Mr. Stephen, who is a graduate of Witwatersrand University, Johannesburg, obtained an M.Sc. degree in 1953 and is at present studying for the degree of D.Phil. under Professor Sir Cyril Hinshelwood, F.R.S. He is proposing during the coming year to carry out research under Professor C. A. Coulson, F.R.S., at Oxford, on the mechanisms and rates of reactions.

The Salters' Company has offered a scholarship to a student from Canada, and, on the recommendation of the National Research Council for Canada, Mr. C. G. Miller has been appointed. Mr. Miller is at present working at Queen's University, Ontario, and is proposing to carry out research during the year of tenure of his scholarship under Dr. Bell, F.R.S., of Oxford University.

The Court of the Salters' Company has also elected the following to be Salters' Scholars for the year 1955-56:—M. McLeman (Imperial College, London), W. L. Wilkinson (Cambridge University), D. Charlesworth (Hull University), P. L. Levine (Imperial College, London), D. M. McMahon (Queen's University, Belfast), W. Kemp (Glasgow University), B. B. Hunt (Cambridge University).

# Publications & Announcements

H. J. ELLIOTT LTD., of Treforest, Glamorgan, makers of E-Mil laboratory glassware and thermometers, have issued a 58-page catalogue describing their range of products. It also contains a chapter on the care of laboratory glassware. Covering the range of British Standards graduated volumetric glassware, E-Mil's Amber Line translucent strip is the newest innovation. The E-Mil Amber Line, being vertical and covering the whole right-hand half of the figured scale, and by accentuating the outline of the meniscus of the fluid, throws all graduations into sharp relief. It is guaranteed indestructible, except by hydrofluoric acid or abrasive action.

* * *

A PAMPHLET illustrating bulk handling, storage, and loading of sulphate of ammonia by a pneumatic system has been issued by Simon Handling Engineers Ltd., of Cheadle Heath, Stockport, Cheshire. The plant described can handle five tons of sulphate of ammonia an hour, and can be worked by one man to control the suction nozzle when distributing to storage. The system minimises dirt nuisance as all handling takes place under suction until just before the point of discharge.

* * *

LINATEX, a 95 per cent pure natural rubber produced from latex in Malaya is widely used in industry. The complete range of its use in abrasion and corrosion resistant linings is described and illustrated in a revised brochure issued by Wilkinson Rubber Linatex Ltd., of Camberley, Surrey. Linatex linings have been found to be resistant to a wide range of chemicals, and are in use on mobile acid tankers.

* * *

NEWLY appointed agents in Britain for the Bodson endoscope, the high precision optical instrument for inspecting interior surfaces, P. W. Allen & Co., visual inspection engineers, of 253 Liverpool Road, London N.1, have just issued an introductory booklet. Made by J. Bodson & Fils, of Puteaux (Seine), France, Bodson endoscopes range from 5/32 in. diameter and 4 in. long. to 1 in. diameter and 23 in. long. Derived from the medical type endoscope, the Bodson is equipped with an objective to register the image and with lenses for transmitting the image to the eye through the eye-piece, and is equipped with its own built-in lighting system.

* * *

THE deservedly great reputation of Joseph Black as a chemist rests on one published paper, 'Experiments on Magnesia Alba, Quicklime and some other Alcaline Substances'. This paper may be justly said to mark the beginning of a new era of chemistry, it is stated in an article in *Endeavour*, Vol. XIV, No. 55, describing the life and work of one of Britain's foremost chemists. Of a more technical nature are articles on 'Organic Compounds of the Metals', 'Porphyrins' and 'The Permanent Magnetisation of Rocks'. *Endeavour* is distributed free of charge to senior scientists, scientific institutions and libraries throughout the world and the editors are always glad to consider the addition of new names to the mailing list, subject to certain limitations.

* * *

CONCENTRATIONS of sulphuric acid ranging from 77 per cent to 94 per cent have been used to test a new flexible hose by the Compoflex Co. Ltd., of 26 Grosvenor Gardens, London S.W.1. Particulars of the hose and the practical working tests it has undergone have just been announced by the company. Made-up of stainless steel wire helix; an inner lining of Molene coated glass cloth; plies of polythene sheeting; a layer of untreated glass cloth; an outer cover of acid and abrasion resistant PVC; and finally a spiral of mild steel wire, the hose was tested under actual working conditions by Pickfords' tank haulage service. Used on an average five times a day over a period of six months, local conditions often necessitated off-loading at pressures up to 22 lb. per sq. in. The concentrations carried were mostly pyrites sulphuric acid, and the temperatures were frequently 33 to 40° C.

* * *

DETAILS of a new Wobbe Index Controller have just been issued by George Kent Ltd., engineers for measurement and control of all fluids, of Luton. Called the Sigma-Kent Wobbe Index Controller (Sigma Instrument Co. make the Wobbe recorder; George Kent Ltd. the Mark 20 pneumatic controller) it affords control of supplies of town gas in

factories to a desired Wobbe number either by automatically adding air to the incoming gas or trimming the output of a mechanical mixing machine by an additional supply of gas. For highly critical industrial processes such as those connected with automatic glass-working machinery it should prove valuable, claim the makers, for it enables more accurate control with higher rates of working because the Wobbe Controller permits a perfectly constant heat transfer to be obtained at the gas burners and makes frequent adjustment of flame length unnecessary.

* * *

'SMALL Liquid and Gaseous Nitrogen Plants' is the title of pamphlet No. 1 produced by H. E. Charlton (Engineers) Ltd., Victoria House, 38 Clarendon Road, Eccles, Manchester. The plants are single column high pressure units. When cooled down, the R-1 and R-2 plants are claimed to produce liquid nitrogen of 99.9 per cent purity at the net rate of 8 litres and 24 litres per hour respectively. This allows for normal transfer losses between the plant and the storage vessels. The N-1 plant will produce up to 24 cu. metres per hour of 99.9 per cent gaseous nitrogen.

* * *

TOWER packings are the subject of a new technical booklet issued by Weinreb & Randall Ltd., 70 New Oxford Street, London W.C.1. This offers to the chemical engineer and designer information on all aspects of this subject, including, it is claimed, much data not previously available. In addition to Raschig rings and Berl saddles this booklet has sections on: materials of construction, pressure drop, variation of efficiency with packed height, theoretical plate values, improvement of liquid distribution and packings as catalyst carriers. A bibliography with comprehensive references is also included.

* * *

A HIGH vacuum pumping unit which will give a vacuum of the order of $10^{-6}$ mm. Hg is one of the items described in the latest catalogue put out by J. W. Towers & Co. Ltd., of Widnes, Lancs. This unit incorporates a quartz three stage mercury vapour diffusion pump, a double Macleod gauge, traps for cooling with liquid air or solid carbon dioxide, a drying vessel for protecting the fore pump, a simple differential manometer, and the necessary high vacuum stopcocks. A backing pump giving a vacuum of 1 mm. Hg or better is required with this unit. This catalogue is not claimed to be a comprehensive list of Towers' equipment and separate catalogues on balances and weights, graduated glassware, and hydrometers are also available. The present volume does however include such things as electric ovens, distillation units, shakers, stirrers, hot plates and filtration apparatus.

* * *

CRODA LTD. have issued a pamphlet on Lanster brand pure lanosterol. Giving a description of lanosterol, the pamphlet states that at present there is no published information to indicate its possible uses except in combination with agnosterol and epinepherine for the treatment of asthma. Its possibilities as a cosmetic ingredient are still being investigated, and now its use as an auxiliary emulsifier is arousing interest. Its high dielectric strength is also causing some interest in the electrical industry. The pamphlet describes lanosterol as very susceptible to oxidation and showing a marked tendency to resinification, and containing two saturated double linkages common to triterpene alcohols.

* * *

A BOOKLET published by Fibreglass Ltd., although listing the company's range of reinforced plastics is more than a catalogue. It can qualify as an instructional booklet on the various techniques available to moulders, and some industrial organisations, too, might find it useful. Liberally illustrated, the booklet contains chapters on bag moulding, the use of platens, casting techniques, autoclave and compression mouldings among others. The autoclave moulding describes the vacuum impregnation method which is a patented method also known as the Marco process and best suited for large symmetrical mouldings.

* * *

AROMATIC halogenation is the subject of a paper in *Science Progress* (Vol. XLIII, No. 171). In this the author, Dr. P. W. Robertson, of Victoria University College, Wellington, NZ. reviews and discusses the various ways in which halogens react with aromatic compounds. Another paper in the same issue describes some recent advances in organic chemistry, including a total synthesis of strychnine by Woodward, Cava, Ollis, Hunger, Daeniker and Schenkart (*J. Amer. Chem. Soc.*, 1954, **76**, 4749). Full experimental details are not yet available but a summary of the method used is given.

# British Chemical Prices

**(These prices are checked with the manufacturers, but it must be pointed out that in many cases there are variations according to quantity, quality, place of delivery, etc.)**

LONDON.—Most sections of the industrial chemicals market are quiet due to seasonal influences but the falling off in home demand is less pronounced than is usual for the period. The movement against contracts is also on a reduced scale. Prices are unchanged on the week and the undertone is firm. Similar conditions obtain in the coal tar products market which has no special feature.

MANCHESTER.—Holiday stoppages at the consuming end continue to exert their influence on the call for heavy chemicals on the Manchester market. Even so, however, the flow of delivery specifications during the past week has been on fairly steady lines, and replacement business has also been on a fair scale. In most sections of the market the price position is very firm. A moderate weight of business has been reported in one or two sections of the fertiliser trade, with a steady demand experienced for most of the light and heavy tar products.

GLASGOW.—The Scottish heavy chemical market is still being affected by the Glasgow Fair holidays. Business, however, in the areas not on holiday has been reasonably brisk, with favourable prospects of continuing. The export market has been very active during the past week, and a good volume of inquiries received.

## General Chemicals

**Acetic Acid.**—Per ton : 80% technical, 10 tons, £83 ; 80% pure, 10 tons, £89 ; commercial glacial, 10 tons, £91 ; delivered buyers' premises in returnable barrels (technical acid barrels free) ; in glass carboys, £7 ; demijohns, £11 extra.

**Acetic Anhydride.**—Ton lots d/d, £123 per ton.

**Alum.**—Ground, about £25 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, £49 per ton.

**Ammonium Chloride.**—Per ton lot, in non-returnable packaging, £27 17s. 6d.

**Ammonium Nitrate.**—D/d, £31 per ton (in 4-ton lots).

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

**Ammonium Phosphate.**—Mono- and di-, ton lots, d/d, £97 and £94 10s. per ton.

**Antimony Sulphide.**—Crimson, 4s. 4d. to 4s. 9½d. ; golden, 2s. 7½d. to 4s. 0¾d. ; all per lb., delivered UK in minimum 1-ton lots.

**Arsenic.**—Per ton, £45 to £50 ex store.

**Barium Carbonate.**—Precip., d/d : 4-ton lots, £39 per ton ; 2-ton lots, £39 10s. per ton, bag packing.

**Barium Chloride.**—£42 15s. per ton in 2-ton lots.

**Barium Sulphate (Dry Blanc Fixe).**—Precip., 4-ton lots, £42 10s. per ton d/d ; 2-ton lots, £43 per ton d/d.

**Bleaching Powder.**—£27 17s. 6d. per ton in returnable casks, carriage paid station, in 4-ton lots.

**Borax.**—Per ton for ton lots, in hessian sacks, carriage paid : Technical, anhydrous, £60; granular, £40 ; crystal, £42 10s. ; powder, £43 10s. ; extra fine powder, £44 10s. ; BP, granular, £49 ; crystal, £51 10s. ; powder, £52 10s. ; extra fine powder, £53 10s.

**Boric Acid.**—Per ton for ton lots, in hessian sacks, carriage paid : Technical, granular, £68 10s. ; crystal, £76 10s. ; powder, £74; extra fine powder, £76; BP granular, £81 10s. ; crystal, £88 10s. ; powder, £86 ; extra fine powder, £88.

**Calcium Chloride.**—Per ton lots, in non-returnable packaging : solid, £15 ; flake, £16.

**Chlorine, Liquid.**—£36 7s. 6d. per ton, in returnable 16-17-cwt. drums, delivered address in 3-drum lots.

**Chromic Acid.**—2s. 0⅝d. per lb., less 2½%, d/d UK, in 1-ton lots.

**Chromium Sulphate, Basic.**—Crystals, 7⅞d. per lb. delivered (£73 10s. per ton).

**Citric Acid.**—1-cwt. lots, £11 5s. cwt. ; 5-cwt. lots, £11 cwt.

**Cobalt Oxide.**—Black, delivered, bulk quantities, 13s. 2d. per lb.

**Copper Carbonate.**—2s. 9d. per lb.

**Copper Sulphate.**—£103 per ton f.o.b., less 2% in 2-cwt. bags.

**Cream of Tartar.**—100%, per cwt., about £11 12s.

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

**Formic Acid.**—85%, £86 10s. in 4-ton lots, carriage paid.

**Glycerine.**—Chemically pure, double distilled 1.260 S.G., £13 3s. 6d. to £13 14s. 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. 3d. to 1s. 6d. 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., 17s. 7d. per lb., in 28-lb. lots.

**Iodoform.**—£1 6s. 7d. per lb., in 28-lb. lots.

**Lactic Acid.**—Pale tech., 44 per cent by weight, 14d. per lb. ; dark tech., 44 per cent by weight, 8¼d. per lb., ex-works ; chemical quality, 44 per cent by weight, 12¼d. per lb., ex-works ; 1-ton lots, usual container terms.

**Lead Acetate.**—White : About £142 10s. per ton.

**Lead Nitrate.**—About £132 10s. 1-ton lots.

**Lead, Red.**—Basis prices per ton. Genuine dry red, £135 10s. ; orange lead, £147 10s. Ground in oil : red, £153 15s. ; orange, £165 15s.

**Lead, White.**—Basis prices : Dry English in 5-cwt. casks, £140 10s. per ton. Ground in oil : English, 1-cwt. lots, 178s. per cwt.

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

**Litharge.**—£137 10s. per ton, in 5-ton lots.

**Magnesite.**—Calcined, in bags, ex-works, about £21 per ton.

**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.**—Crystals, £16 per ton.

**Mercuric Chloride.**—Technical Powder, £1 8s. 9d. per lb., in 5-cwt. lots ; smaller quantities dearer.

**Mercury Sulphide, Red.**—£1 11s. 3d. per lb., for 5-cwt. lots.

**Nickel Sulphate.**—D/d, buyers UK £170 per ton. Nominal.

**Nitric Acid.**—80° Tw., £35 per ton.

**Oxalic Acid.**—Home manufacture, minimum 4-ton lots, in 5-cwt. casks, about £130 per ton, carriage paid.

**Phosphoric Acid.**—Technical (S.G. 1.700) ton lots, carriage paid, £92 per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 3½d. per lb.

**Potash, Caustic.**—Solid, £93 10s. per ton for 1-ton lots ; Liquid, £36 5s.

**Potassium Carbonate.** — Calcined, 96/98%, about £74 per ton for 1-ton lots, ex-store.

**Potassium Chloride.**—Industrial, 96%, 1-ton lots, about £24 per ton.

**Potassium Dichromate.**—Crystals and granular, 1s. 1d. per lb., in 1-ton lots, d/d UK.

**Potassium Iodide.**—B.P., 14s. 1d. per lb. in 28-lb. lots ; 13s. 7d. in cwt. lots.

**Potassium Nitrate.**—In 4-ton lots, in non-returnable packaging, paid address, £63 10s. per ton.

**Potassium Permanganate.**—BP, 1-cwt. lots, 1s. 9d. per lb. ; 3-cwt. lots, 1s. 8½d. per lb. ; 5-cwt. lots, 1s. 8d. per lb. ; 1-ton lots, 1s. 7⅞d. per lb. ; 5-ton lots, 1s. 7¼d. per lb. ; Tech., 5-cwt. packed in 1-cwt. drums, £8 14s. 6d. per cwt. ; packed in 1 drum, £8 9s. 6d. per cwt.

**Salammoniac.**—Per ton lot, in non-returnable packaging, £45 10s.

**Salicylic Acid.** — MANCHESTER : Technical 2s. 7½d. per lb. d/d.

**Soda Ash.**—58% ex-depot or d/d, London station, about £15 5s. 6d. per ton, 1-ton lots.

**Soda, Caustic.**—Solid 76/77% ; spot, £26 to £28 per ton d/d (4 ton lots).

**Sodium Acetate.**—Commercial crystals, £91 per ton d/d.

**Sodium Bicarbonate.**—Per ton lot, in non-returnable packaging, £15 10s.

**Sodium Bisulphite.** — Powder, 60/62%, £41 to £43 per ton d/d in 2-ton lots for home trade.

**Sodium Carbonate Monohydrate.**—Per ton lot, in non-returnable packaging, paid address, £59 5s.

**Sodium Chlorate.**—About £75 per ton in free 1-cwt. drums, carriage paid station, in 4-ton lots.

**Sodium Cyanide.**—96/98%, £113 5s. per ton lot in 1-cwt. drums.

**Sodium Dichromate.**—Crystals, cake and powder, 10¾d. per lb. Net d/d UK, minimum 1-ton lots; anhydrous, 1s. 0½d. per lb. Net del. d/d UK, minimum 1-ton lots.

**Sodium Fluoride.**—Delivered, 1-ton lots and over, £4 15s. per cwt.; 1-cwt. lots, £5 5s. per cwt.

**Sodium Hyposulphite.**—Pea crystals £34 15s. a ton; commercial, 1-ton lots, £31 10s. per ton, carriage paid.

**Sodium Iodide.**—BP, 17s. 1d. per lb. in 28-lb. lots.

**Sodium Metaphosphate (Calgon).**—Flaked, loose in metal drums, £127 per ton.

**Sodium Metasilicate.**—£24 per ton, d/d UK in ton lots, loaned bags.

**Sodium Nitrate.**—Chilean Industrial, over 98% 6-ton lots, d/d station, £27 10s.

**Sodium Nitrite.**—£32 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, £81; tri-sodium, crystalline, £39 10s., anhydrous, £79.

**Sodium Silicate.**—75-84° Tw. Lancashire and Cheshire, 4-ton lots, d/d station in loaned drums, £10 15s. per ton; Dorset, Somerset and Devon, £3 17s. 6d. per ton extra; Scotland and S. Wales, £3 per ton extra. Elsewhere in England, excluding Cornwall, and Wales, £1 12s. 6d. per ton extra.

**Sodium Sulphate (Glauber's Salt).**—About £8 10s. 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, £33 2s. 6d. per ton, d/d, in drums; broken, £33 2s. 6d. 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, £20 to £22, according to fineness.

**Sulphuric Acid.**—Net, naked at works, 168° Tw. according to quality, per ton, £10 7s. 6d. to £12; 140° Tw., arsenic free, per ton, £8 12s. 6d.; 140° Tw., arsenious, per ton, £8 4s. 6d.

**Tartaric Acid.**—Per cwt.: 10 cwt. or more £12 10s.

**Titanium Oxide.**—Standard grade comm., with rutile structure, £162 per ton; standard grade comm., £142 per ton.

**Zinc Oxide.**—Maximum price per ton for 2-ton lots, d/d, white seal, £107; green seal, £105; red seal, 2-ton lots, £103 per ton.

### Solvents & Plasticisers

**Acetone.**—Small lots: In 5-gal. cans: 5-gal., £125 10-gal. and upward, £115, cans included. In 40/45 gal. returnable drums, spot: Less than 1 ton, £90; 1 to less than 5 tons, £87; 5 to less than 10 tons, £86; 10 tons and upward, £85. In tank wagons, spot: 1 to less than 5 tons (min. 400 gal.), £85; 5 to less than 10 tons (1,500 gal.), £84; 10 tons and upward (2,500 gal.), £83; contract rebate, £2. All per ton d/d.

**Butyl Acetate BSS.**—£159 per ton, in 1-ton lots; £167 per ton, in 10-ton lots.

***n*-Butyl alcohol, BSS.**—10 tons, in drums, £143 per ton d/d.

***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 £119 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.

**Diacetone Alcohol.**—Small lots: 5 gal. drums, £177 per ton; 10 gal. drums, £167 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.

**Dibutyl Phthalate.**—In drums, 10 tons, 2s. per lb. d/d; 45 gal. drums, 2s. ¾d. per lb. d/d.

**Diethyl Phthalate.**—In drums, 10 tons, 1s. 11½d. per lb. d/d; 45 gal. drums, 2s. 1d. per lb. d/d.

**Dimethyl Phthalate.**—In drums, 10 tons, 1s. 9d. per lb. d/d; 45 gal. drums, 1s. 10½d. per lb. d/d.

**Dioctyl Phthalate.**—In drums, 10 tons, 2s. 8d. per lb. d/d; 45 gal. drums, 2s. 9½d. per lb. d/d.

**Ether BSS.**—In 1 ton lots, 1s. 11d. per lb.; drums extra.

**Ethyl Acetate.**—10 tons lots, d/d, £128 per ton.

**Ethyl Alcohol (PBS 66 o.p.).**—Over 300,000 p. gal., 2s. 9d. ; 2,500-10,000 p. gal., 2s. 11½d. per p. gal., d/d in tankers. D/d in 40/45-gal. drums, 1d. p.p.g. extra. Absolute alcohol (75.2 o.p.) 5d. p.p.g. extra.

**Methanol.**—Pure synthetic, d/d, £43 15s. per ton.

**Methylated Spirit.**—Industrial 66° o.p. : 500 gal. and over in tankers, 4s. 10d. per gal. d/d ; 100-499 gal. in drums, 5s. 2½d. per gal. d/d. Pyridinised 64 o.p. : 500 gal. and over in tankers, 5s. 0d. per gal. d/d ; 100-499 gal. in drums, 5s. 4½d. per gal. d/d.

**Methyl Ethyl Ketone.**—10-ton lots, £133 per ton d/d. ; 100-ton lots, £131 per ton d/d.

**Methyl *iso*Butyl Ketone.**—10 tons and over £159 per ton.

***iso*Propyl Acetate.**—In drums, 10 tons, £123 per ton d/d ; 45 gal. drums, £129 per ton d/d.

***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.

### Rubber Chemicals

**Carbon Bisulphide.**—£61 to £67 per ton, according to quality.

**Carbon Black.**—8d. to 1s. per lb., according to packing.

**Carbon Tetrachloride.**—Ton lots, £76 10s. per ton.

**India-Rubber Substitutes.**—White, 1s. 5¾d. to 1s. 9½d. per lb. ; dark, 1s. 4d. to 1s. 6¾d. per lb. delivered free to customers' works.

**Lithopone.**—30%, about £54 per ton.

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

**Sulphur Chloride.**—British, about £50 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 farmers' nearest station : March to June, £18.

**Compound Fertilisers.**—Per ton in 6 ton lots, d/d farmer's nearest station, I.C.I. Special No. 1. January to June, £25 14s.

**'Nitro-Chalk.'**—£15 14s. per ton in 6-ton lots, d/d farmer's nearest station.

**Sodium Nitrate.**—Chilean agricultural for 6-ton lots, d/d nearest station : June to July, £26 10s.

### Coal-Tar Products

**Benzole.**—Per gal., minimum of 200 gals. delivered in bulk, 90's, 5s. ; pure, 5s. 4d.

**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. 9d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 1s. to 1s. 8d. per gal.

**Cresylic Acid.**—Pale 99/99½%, 5s. 10d. per gal. ; 99.5/100%, 6s. per gal. D/d UK in bulk : Pale A.D.F. from 5s. 8d., per Imperial gallon, f.o.b.

**Naphtha.**—Solvent, 90/160°, 4s. 10d. per gal. ; heavy, 90/190°, 3s. 9½d. per gal for bulk 1000-gal. lots, d/d. Drums extra ; higher prices for smaller lots.

**Naphthalene.**—Crude, 4-ton lots, in buyers' bags, £17 5s. to £30 16s. per ton nominal, according to m.p. ; hot pressed, £40 per ton in bulk ex-works ; refined crystals, £56 10s. per ton d/d, mis. 4-ton lots.

**Pitch.**—Medium, soft, home trade, £9 per ton f.o.r. suppliers' works ; export trade about £10 10s. per ton f.o.b. suppliers' port.

**Pyridine.**—90/160°, £1 2s. 6d. to £1 5s. per gal.

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

**Xylole.**—For 1000-gal. lots, 5s. 10d. to 6s. per gal., according to grade, d/d London area in bulk.

### Intermediates & Dyes (Prices Nominal)

***m*-Cresol** 98/100%.—4s. 3d. per lb. d/d.

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

***p*-Cresol** 34/35° C.—4s. 3d. per lb. d/d.

**Dichloraniline.**—4s. 1d. 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. 7d. per lb.

**Nitrobenzene.**—Spot, 9½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

**Nitronaphthalene.**—2s. per lb.

***o*-Toluidine.**—1s. 9d. per lb., in 8/10-cwt. drums, drums extra.

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

**Dimethylaniline.**—3s. 1d. per lb., drums extra, carriage paid.

# Chemical & Allied Stocks & Shares

THE further general advance in share values in evidence for the greater part of this month was followed by a reaction on Monday in front of Mr. Butler's statement on economic affairs. The Chancellor's measures to check inflation at home and strengthen the value of the £ in world markets were much less severe than had been expected. Instead of an advance in the bank rate to as much as 6 per cent, which had been predicted in some quarters, there is a further tightening of H.P. regulations, a clamping down on loans and overdrafts by the banks and an appeal to industry and also to local authorities and the nationalised industries to go slow on new capital expenditure projects. These measures, though much less spectacular than a big rise in the bank rate, the City thinks are likely to prove more effective in the long run.

It is of course essential for sterling to strengthen, and for inflation to be checked, otherwise the effect on our export trade could be serious in a few months. But the fact that the Chancellor has decided on more moderate means than a big bank rate rise, indicates confidence in the outlook. This is the view taken by stock markets, and is why they rallied fairly sharply after the Chancellor's speech. It should not, however, be overlooked that the credit squeeze means that many companies will not be able to get loans from their bankers.

As was to be expected shares of chemical and allied companies reflected the general trend in stock markets, and moved lower compared with a month ago, though after Monday's sharp reaction, a rallying tendency developed. Imperial Chemicals at 55s. compare with 56s. 10½d. a month ago, Monsanto 5s. shares have eased on the month from 35s. 6d. to 34s. 3d., but Laporte 5s. shares have risen on balance from 21s. to 22s. 6d. Hickson & Welch 10s. shares came into steady demand, and advanced on balance from 25s. 9d. to 28s. 3d., but elsewhere, Fisons were 62s., compared with 64s. 3d. a month ago. Reichhold 5s. shares have moved up from 19s. 3d. to 20s. 6d. after touching 22s.

Another share in steady demand, Albright & Wilson 5s. ordinary, have risen compared with a month ago from 22s. 9d. to 26s. 3d. Anchor Chemical 5s. shares at 14s. were 9d. higher on balance, while F. W. Berk rose from 9s. 7½d. to 10s. 7½d. On the other hand, Yorkshire Dyeware & Chemical 5s. shares eased from 12s. 6d. to 12s. Lawes' Chemical 5s. shares at 16s. 3d. moved slightly higher on the month, but Hardman & Holden 5s. shares eased from 15s. to 14s. 6d. Brotherton 10s. shares have risen from 37s. to 39s. In other directions, British Chrome Chemicals 5s. shares were 14s. compared with 14s. 6d. a month ago, Ashe Chemical 1s. shares changed hands around 1s. 6d., and British Glues 4s. shares at 15s. 7½d. were well maintained on balance. Borax Consolidated were 140s., against 144s. 6d. a month ago.

Greeff Chemicals 5s. shares have been active up to 20s. 6d. Unilever have not held best levels, but at 96s. compared with 89s. a month ago. Boots Drug 5s. shares were 20s. 'ex' the scrip issue. Oils came into strong demand and advanced to record all time levels on the switch from coal to oil and the big prospects of still further expansion opened for the oil industry. Best levels have not been held, but compared with a month ago, Shell have risen from 135s. 7½d. to 146s. 10½d. and Burmah Oil from 160s. to 176s. 3d. Elsewhere the 6s. 8d. units of the Distillers Co. have receded from 32s. 3d. a month ago to 28s. 3d. despite the increased dividend.

## Solvents Price Changes

TWO companies, Shell Chemicals Ltd., and British Industrial Solvents (Bisol), have announced changes in prices of some of their products with effect from 25 July. Shell's list of new spot prices in 40/45 gal. drum (10 tons in one delivery) are:

| | |
|---|---|
| Methyl ethyl ketone ... | £133 per ton |
| Methyl isobutyl ketone | £159 per ton |
| Secondary butyl alcohol | £119 per ton |
| Methyl isobutyl carbinol | £153 per ton |

Bisol's new prices for 10-ton spot purchases, delivered in the UK in 40/45 gal. drums are:

| | |
|---|---|
| *n*-Butyl alcohol ... ... | £143 per ton |
| Butyl acetate ... ... ... | £159 per ton |
| Ethyl acetate ... ... | £128 per ton |
| Isopropyl acetate ... ... | £123 per ton |
| Amyl acetate, technical ... | £230 per ton |
| Amyl acetates, BSS ... ... | £232 per ton |
| Amyl acetate confectionery | £259 per ton |
| Methyl ethyl ketone ... | £133 per ton |

# 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.)

KENT SPRAYING CONTRACTORS LTD., Kemsing, spraying insecticides, etc.—20 June, £400 (not ex.) mortgage to Lloyd's Bank Ltd.; charged on Clement House, Kemsing. *Nil. 20 October, 1954.

WHITEHEAD CHEMICAL CO. (ENGINEERING) LTD., Waterfoot.—15 June, by order on terms, £3,056 mortgage, to T. H. Metcalfe Industrial Service Ltd.; charged on Park Mill, Britannia, Bacup.

### Satisfactions

EDUCATIONAL & SCIENTIFIC PLASTICS LTD., Coulsdon.—Satisfaction 23 June of mortgage registered 4 October, 1954.

PETROCHEMICALS LTD., London W.—Satisfactions, 24 June of trust deeds registered 3 June, 1949, and 18 January, 1950, supplemental mortgages registered 19 September, 1950, trust deed registered 16 May, and supplemental mortgages registered 5 June and 29 August, 1951, debenture registered 20 February and supplemental mortgages registered 7 August, 1952, and 13 August, 1954.

VAUXHALL REFINING CO., LTD., Liverpool.—Satisfactions 22 June of debenture and a charge both registered 15 June, 1953.

C.M.W. LABORATORIES LTD., Preston.—Satisfaction, 13 June, of charge registered 13 May, 1954.

## New Registration

### Pectosol Marketing Co. Ltd.

Private company (552,123.) Capital £20,000 in £1 shares. To carry on the business of manufacturers of, and dealers in soil stabilisation products using cement, etc. Directors: Conrad L. Walsh, Geoffrey L. Walsh and Alick V. F. Hampton. Reg. office: 16 Great College Street, London S.W.1.

### James Starr & Co. Ltd.

Private company (551,900.) Capital £5,000. To acquire the business of manufacturing chemist carried on by Edith L. Starr, Derby. Directors: Edith L. Starr and Kenneth F. Boardman-Weston. Reg. office: 18 Newland Street, Derby.

## Company News

### British Tar Products

In his statement, the chairman of British Tar Products said that in view of the improved trend in the chemical industry in general it might have been thought that the company would show better results for the year just ended. Results were adversely affected by large decreases in sales of pure benzole with the result that refined benzole had to be sold in the form of commercial and motor benzole which command a lower price. The gross trading profits at £87,653 declined in comparison with the previous year. After taxation the balance on revenue account is £30,963, compared with £33,503 in the previous year and the board are recommending a final dividend of 20 per cent, less tax, making 25 per cent, less tax.

### Mirrlees Watson Co. Ltd.

Demand for chemical and distilling plant from Scottish concerns continues at a very satisfactory level. The Mirrlees Watson Co. Ltd., of Glasgow, in its annual report states that they have booked a considerable volume of new business over the past year for chemical and distillation plants, tannin extract plant, and evaporators, much of which is of copper construction. The design and manufacture of vacuum equipment for use in various industries is a special interest of this company. A feature of this trade is a demand for faster delivery, and production has been organised to meet the situation. Like other companies doing international business, this firm has found it necessary to maintain regular visits abroad and executives have visited recently India.

[continued on page 246

## Company News

*contined from page 244*]

Burma, Pakistan, Africa, Mauritius, British West Indies, the Dominican Republic, the US, Mexico, Venezuela, Guatemala, British Honduras, China, the Philippines and the European Continent, to which markets the company is currently providing a steady flow of specialised plant.

### Griffiths Hughes Proprietaries Ltd.

Consolidated profits earned by the Griffiths Hughes group for the year ended 31 March, 1955, totalled £424,563, an increase of £40,306 over the preceding year. It is proposed to allocate to dividends £95,625—which will cover the five per cent preference dividend for the year, and provide for the proposed 7½ per cent dividend on the ordinary stock.

### A.P.V. Company

Money is being raised to pay off the existing £650,000 4¾ per cent loan stock 1957-61, to finance the purchase of further plant and increased investment in subsidiaries, and to provide working capital for the group's increasing turnover—hitherto financed by bank loans. Ordinary shareholders are being offered one new share at 14s. for every four held. Ordinary and preference shareholders, as well as loan stockholders, are being offered £1,500,000 five per cent first mortgage debenture stock 1980-85 at £99. Lists are open until 12 August. Seligman Brothers have underwritten both issues.

### Benn Brothers Limited

The directors of Benn Brothers Ltd. (the publishers of THE CHEMICAL AGE) recommend the payment of the following final dividends less tax, for the year ended 30 June 1955:—3 per cent on preference shares, which with the interim dividend of 3 per cent paid in February makes 6 per cent for the year. Ten per cent on ordinary shares, which with the interim dividend of 5 per cent paid in February makes 15 per cent for the year. Capital bonus of 3d. per ordinary share payable out of capital reserve.

### The Distillers Co. Ltd.

Manufacturing and trading profits of The Distillers Co. Ltd. and its subsidiary companies, before depreciation, for the year ended 31 March, 1955, was £19,663,854 as compared with £18,202,974 for the previous year. Provision for depreciation being £1,594,781. Income tax is £7,592,267; profits tax £2,107,983. Balance of profit remaining unappropriated is £76,790 to which is added balance brought forward from previous year (£2,039,495) making £2,116,285. An interim dividend has been paid on the ordinary share capital, then amounting to £25,030,622, at the rate of four and four-fifths pence per 4s. share, less tax, requiring £1,376,684. The directors recommend payment of a final dividend on the ordinary share capital, now amounting to £41,771,704, at the rate of eight and two-fifths pence per 6s. 8d. share, less tax, requiring £2,518,706.

## Germany's Future

### More Capital Needed for New Projects

IN a speech made at the annual general meeting of the German firm, Kali-Chemie AG., in Hanover, the chairman, Dr. Reuleaux said: 'It is clear that Germany will not be able to recover her leading position among world chemical producers, and it is all the more urgent, therefore, not to relax, but to promote vigorously both research and development. In the chemical industry, more than anywhere else, to stand still means to fall behind.'

Announcing first results for the current year, Dr. Reuleaux referred to favourable developments of the company, particularly in the sales of fertiliser products. In this field it had taken steps to widen its fertiliser production, and sales of Rhemania phosphate fertiliser were taken over by Verkaufsgemeinschaft Deutscher Kaliwerke GmbH on 1 May. This organisation, established jointly by the West German potash undertakings, has an extensive distribution network.

In the field of catalyser production, Kali-Chemie AG. has concluded long-term contracts with the majority of oil refineries it deals with, both inside and outside Germany, for supplying their cracking plants.

'At the present time,' Dr. Reuleaux said, 'the chemical industry is riding the crest of a wave of developments in petrol chemistry and the plastics industry following a similar movement some 20 or 30 years ago based on coal chemistry.' The whole chemical industry is involved in this advance, indirectly if not directly, and as a result capital requirements for new investments are particularly large. The vistas opened by the chemical industry for meeting the needs of everyday life are limitless.'

# 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.

**BRITISH TITAN PRODUCTS COMPANY LIMITED** invites applications for posts in both its Research and Technical Sales Service laboratories from **GRADUATE CHEMISTS** with qualifications or experience in physical or inorganic chemistry; post-graduate qualifications would be an advantage. Applicants must be British subjects.

Conditions of work and service are very attractive and there are Staff Bonus and Superannuation Schemes and non-contributory Life Insurance cover. Commencing salary dependent on age, qualifications and experience. Assistance in house purchase and removal expenses is available for the successful applicant.

Application Forms may be obtained from the **PERSONNEL MANAGER, BRITISH TITAN PRODUCTS COMPANY LIMITED, COPPERGATE, YORK,** quoting reference S.14.F. All applications will be treated in strictest confidence.

**DRAUGHTSMEN**

VACANCIES for Draughtsmen with experience in the following fields :—

(*a*) Heavy Plant Work.
(*b*) Mechanical Handling.
(*c*) Structural Steel.

Working conditions and scope good. Five-day week, three weeks' holiday, luncheon facilities, pension scheme. Initial salaries depending on age and experience up to £800 per annum for senior men.

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**ENGINEER, CHEMICAL ENGINEER OR CHEMIST** with Engineering, Chemical & Technical Sales experience for developing and marketing Petroleum Chemical Plant, required by **THE POWER-GAS CORPORATION LTD., STOCKTON-ON-TEES.** Age about 30 years. The appointment will be confirmed on a permanent basis if satisfactory after a trial period of twelve months. It is anticipated that the post will involve periodic journeys abroad and in making the appointment emphasis will be placed on ability to grasp new ideas and techniques, together with initiative and commonsense.

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**NORTH CHESHIRE GROUP**
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APPLICATIONS are invited for the above pensionable appointment at a salary within A.P.T.11 (£785-£910 per annum).

The successful applicant will be responsible to the Station Engineer for all the chemical control connected with the operation of the works and to carry out any special investigations which may be required from time to time.

Applicants should possess suitable technical qualifications. Gas works experience will be an advantage, although not essential.

Detailed applications, giving the names of two referees, should reach the **GENERAL MANAGER, N.W.G.B. (NORTH CHESHIRE GROUP), GREAT PORTWOOD STREET, STOCKPORT,** within fourteen days.

**CHEMISTS,** capable of occupying responsible positions in Australia, required by **LEWIS BERGER & SONS (AUSTRALIA) PTY. LTD., SYDNEY.** Minimum qualifications B.Sc. Age 30-40. Senior posts require at least 8 years' experience in the Paint, Varnish and Lacquer Industry. Applicants must have had service in a position of responsibility calling for organising ability and initiative. Suitable applicants will be interviewed in London during July or August. Apply in strict confidence, giving full details, to **PERSONNEL OFFICER, BERGER HOUSE, BERKELEY SQUARE, W.1.** marking applications "Australia."

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**BILLINGHAM DIVISION**
**CHEMICAL ENGINEERS**

THIS Division, the largest of the chemical manufacturing divisions of I.C.I., has several vacancies for **CHEMICAL ENGINEERS.**

In the first place, the work will be in the Engineering Research Department, but plant and design experience will follow. A progressive and interesting career is, therefore, offered to suitable candidates. These appointments are to our Senior Staff and a good Honours Degree is considered essential.

Write, giving full details of age, qualifications and experience, to the
**STAFF MANAGER,**
**IMPERIAL CHEMICAL INDUSTRIES LIMITED,**
**BILLINGHAM DIVISION,**
**BILLINGHAM, CO. DURHAM.**
Quoting Ref. No. A1.

**INDUSTRIAL CHEMIST** required by leading container closure manufacturers in Midlands. Progressive position requiring knowledge metal printing, varnishing, stoving, and metallurgy, associated with food packaging industry, Maximum age 35 years.—Written applications, with details of experience previous appointments, etc., to **P. A. METAL CLOSURES LTD., BROMFORD LANE, WEST BROMWICH, STAFFS.**

**SENIOR RESEARCH CHEMIST**

BRITISH ENKA, LTD., Rayon Yarn Producers, require a Senior Research Chemist to take charge of group. Minimum qualifications Ph.D., preferably with research experience. Commencing salary, £1,000 to £1,500 per annum. Good prospects. Pension Scheme. Applications, which will be treated in confidence, should state age, qualifications, details of experience, and be addressed to Personnel Manager, British Enka, Ltd., Aintree, Liverpool, 9.

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**MORPHOLINE**—3 tons first quality American material available for immediate delivery from London stocks. Sample available on request. **BOX No. C.A. 3421, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

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**MORTON, SON AND WARD LIMITED** offer **TWO** 50g **STAINLESS STEEL AUTOCLAVES,** 50 lb. p.s.i. internal pressure 20g stainless steel **JACKETED PAN,** bottom outlet, 40 lb. p.s.i., w.p. **NEW** stainless steel **CONTAINERS,** outlets optional, closed or open. **MIXERS 'MORWARD' 'U'** shaped **TROUGH MIXERS** in s.s. or m.s. made in all sizes, jacketed or otherwise. Scroll or paddle type agitators. 3 cwt. **TROUGH MIXER** by **CHALMERS,** s.s. lined tilting trough. 3 cwt. **TROUGH MIXERS** by **GARDNER,** s.s. lined troughs. **STRUCTURAL** and general **FABRICATION** requirements catered for **PUMPS.** A selection of new **MONO** and other second hand **PUMPS** in stock. 2" to 5". **ENQUIRIES INVITED, MORTON, SON AND WARD LIMITED, WALK MILL, DOBCROSS, NR. OLDHAM,** Lancs. Telephone: Saddleworth 437.

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**(10) UNUSED CONDENSERS**—3 ft. 6 in. by 5 in. diam. brass & copper shells - 325—¼ in. diam. copper tubes.

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**5 NEW TWIN ROLL SPRAY DRIERS.** Chilled cast-iron rolls 40 in. long by 32 in. diam. 74 lb. sq. in. w.p., fitted air-cooled doctor blades, rotary disc distribution trough, air spray jets and worm discharge conveyors. Fitted stainless steel feed pump, jacketed feed tank and powder dresser.

**DOUBLE-DRUM DRIER**—by John Brown. Two main steam-heated cylinders 10 ft. by 32 in. diam. Material to be dried is fed through rollers, removed by doctor knives, under which are two water-cooled rolls for cooling, producing flaky material. Material then collected in two motorised worm conveyors. Pressure, 90 lb. sq. in. in main cylinder. Capacity with soap, 9/12 cwt. per hr. reducing from 30 per cent to 10 per cent.

**3 NEW VACUUM DRYING OVENS.** Welded mild steel construction. 7 ft. long by 42 in. wide by 42 in. deep, fitted 9 steam-heated shelves to carry 36 acid-resisting trays 36 in. by 16 in. by 1¾ in. Davit-swung door each end, hand wheel closing. Motorised horizontal wet vacuum pump, gauges, metal trays, etc.

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80 qt. Peerless **MIXER**—4-speed type, with sun and planet type agitator, 400/3/50. Fitted whisk and 80 and 50 qt. bowls.

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**HYDRO EXTRACTORS**—24 in., 30 in. and 36 in.

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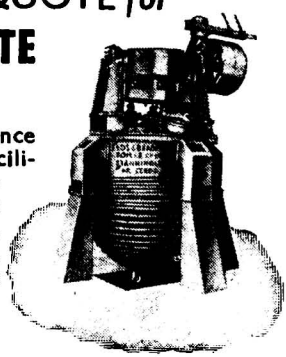

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# INDEX to advertisers in this issue

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