Chemical Age

WILSON REPORT ON COAL DERIVATIVES
(page 281)

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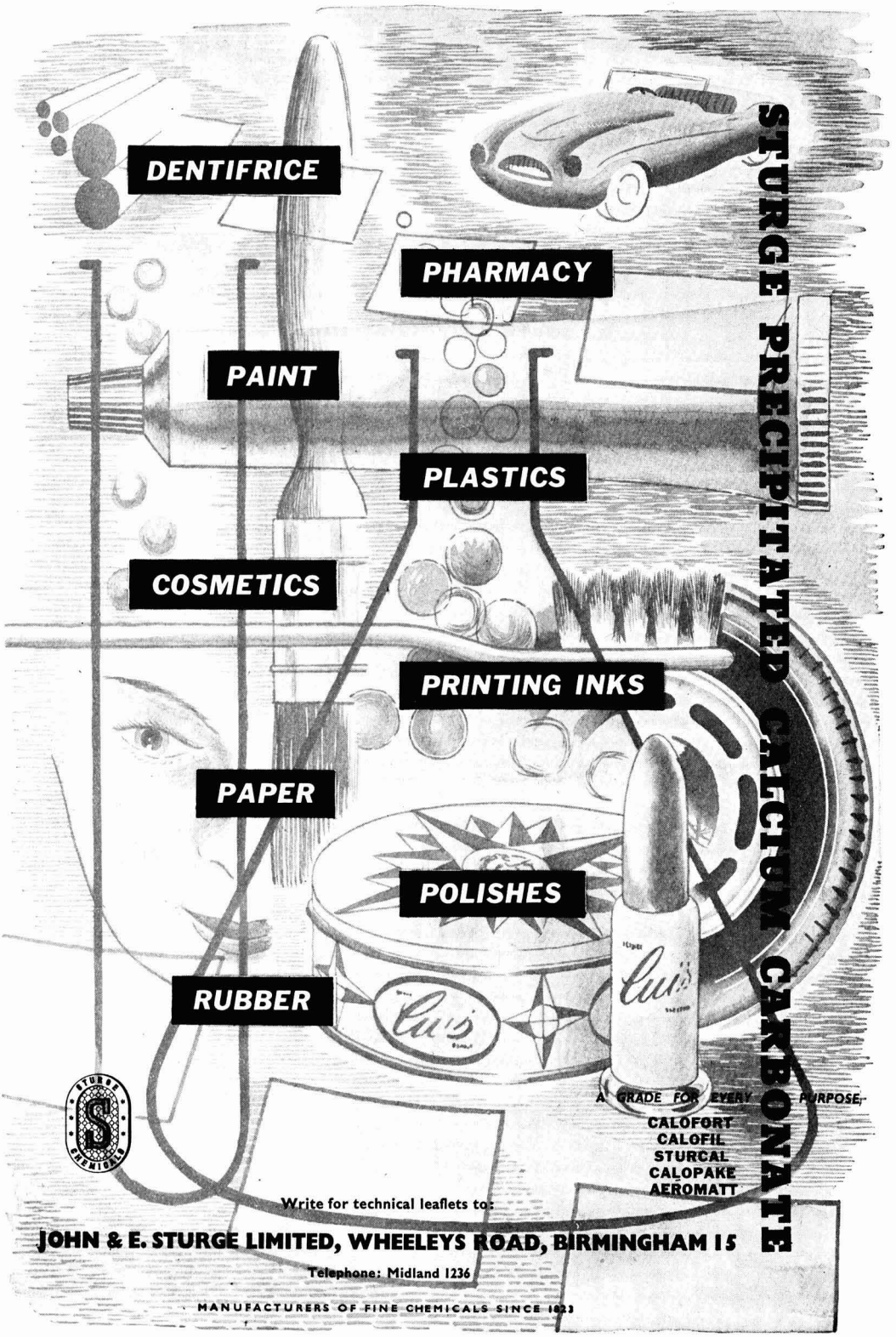
THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY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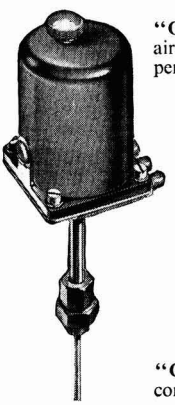

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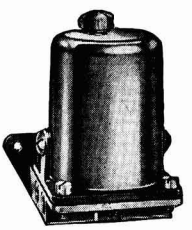

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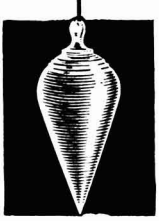

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CHEMICAL AGE

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WORLD FERTILISERS

THE recent FAO Annual Review, summarised last week in p. 137, has greater significance than usual for it brings to a close two decades of unprecedented expansion that started in 1939. No period in the history of fertilisers has been more expansive than 1939-59.

During the war the dire necessity to produce more food brought sharp increases in fertiliser production and consumption in many countries. In other countries, however, greater need for fertilisers during the war period was frustrated by damage to fertiliser works and by shortages of raw materials. Whether in fact the war years had increased or decreased fertiliser use, the post-war period began with a far greater appreciation of fertilisers almost everywhere in the world.

A third influence has been the construction of fertiliser works in countries that achieved independence after the war. The less developed countries, too, have received international aid in the form of loans, supplies, technical knowledge and advice.

These trends have led to the statement in the latest F.A.O. Review that the most salient feature is the "spectacular growth of the industry, which has almost trebled its level of operations in only two decades." Many have wondered whether the rate of advancement could so persistently continue. The remarkable fact is that it has. The question now is whether expansion will continue in the next decade.

In many of the world's agricultural areas, the rate of fertiliser use is still very low, Africa, for example, still only accounts for 3.5% of total world consumption, although consumption of nitrogen and potash has almost doubled in the last six years, and South America, which uses only about 2% of world consumption, has raised usage in the past six years by under 50%. These figures reflect the wide difference in fertiliser usage by the world's continents. Between them, Europe, North and Central America and Oceania consume 88% of the world total.

This gulf must be set against current fears that there is an excess of world fertiliser production capacity. As is rightly said in the F.A.O. report, the main effect of such anxiety is to promote use wherever possible, and there is certainly plenty of opportunity in most of the world.

Europe maintains her position of being the largest fertiliser exporter—in terms of nutrient content (N, P_2O_5 plus K_2O), nearly 1.5 million tonnes were exported in 1958-59. All the other continents were net importers, Asia being the largest with an annual import of 848,000 tonnes. Whether the near future will see a point where world production capacity is embarrassingly exceeding world demand—and clearly this would mainly disturb the European industry—depends mostly on the rates at which usage rises in the other continents. For Asia production has risen by over 60% since 1953-54 but consumption has risen by nearly 70%—net import needs widening considerably in tonnage terms. This assessment excludes data for China, as is usual with F.A.O. reports.

The biggest risk of excess production is for nitrogenous fertilisers. Europe's production of all fertilisers rose by 6% in 1958/59, but her production of nitrogen fertilisers rose by 10%. This tendency for nitrogen

output to rise more sharply is, of course, due to the fundamental flexibility of the synthetic process; given fuel or power in adequate supply, nitrogen fertilisers can be synthesised anywhere in the world. Fortunately this risk of over-production for nitrogen is compensated by the fact that in most expansions of fertiliser use, nitrogen is initially the most needed nutrient and the one that crops in general respond to most. In the long run, rising world demand for nitrogen is likely to match rising production; but there could be a temporary period of imbalance.

As for detailed points, possibly the most interesting information given in the report is about urea. Urea is not yet of major account in either of world nitrogen production or consumption, but in one year the tonnage made for fertilisers rose by 34%; and that assessment was based on incomplete data. New urea plants or expansions are proposed in 14 countries, with a total additional output of 865,000 tonnes. This increase is nearly twice the present fertiliser usage of urea. (I.C.I. will make urea in their projected £10 million Severnside fertiliser complex, but capacity is not disclosed.)

To date, the widespread trend towards greater nutrient concentration in fertilisers has been favouring the advance of ammonium nitrate, but urea may become another powerful rival to the older and more conventional ammonium sulphate. Its fertiliser development has been delayed by lack of supplies, a situation aggravated by the high demand for urea by the plastics industry. Urea's fertiliser use will be promoted by the demand for more concentration, a demand that in turn is increased by international trade in fertilisers—the farther fertilisers must travel to be sold, the greater the economic advantage of high nutrient contents.

FUTURE OF COAL-TAR INDUSTRY

THE Wilson committee on coal derivatives devoted most of their report (see p. 281 for summary) to problems concerned with the complete gasification of coal. While this aspect is undoubtedly of major national importance, most of the development work is of a long-term nature and a more precise assessment of the role of large-scale gasification units in the gas industry will have to wait the start up and operational experience of the two Lurgi plants—at Westfield and Coleshill—and until development work on high-pressure slagging gasifiers has been completed.

The section of the report of more immediate interest to the chemical industry is that dealing with the by-products of carbonisation. The committee sees very clearly the main problem facing tar distillers—that of producing chemicals at a competitive price and finding sufficient outlets for their products.

In the past few years, this industry has suffered adverse conditions and despite the changing pattern of demand, the committee believes that the supply of coal tar and benzole will increase slightly during the next 10 years. Factors likely to affect development in the coal tar sector in the 1960s are the steel industry's expanding demands for metallurgical coke, the installation of Lurgi gasification plants which will lead to the production of less by-products per therm of gas produced and the fact that these by-products will be more difficult to separate into useful fractions.

While all-round demand for aromatics is rising, the increases forecast vary from chemical to chemical and it is obvious that demand for some products will remain more or less stationary.

The current shortage of naphthalene (CHEMICAL AGE, 13 August, p. 234), is largely occasioned by demand for its use in the production of phthalic anhydride. It is interesting to note that the committee thinks it may be necessary to pay some attention to the development of large-scale processes for the production of phthalic anhydride from α- and β-methyl naphthalenes and from phenanthrene. *o*-Xylene, a petroleum-based product, is likely to be a big competitor in this field in the future, with U.S. firms having large excess production which they intend to market in Europe.

U.S. *o*-xylene capacity, difficult to assess accurately because the quantity is a function of refinery throughput and feed-stream content, has been placed currently at 181 million lb./year, scheduled to rise with new plants by Cities Service and Sinclair Chemical to 404 million lb. by 1961. Of next year's total, Japan will taken the largest share with Italy, France and West Germany using most of the balance. *o*-Xylene is not at present likely to replace the oxidation of naphthalene in existing phthalic anhydride plants, except during periods of short supply for naphthalene, because it cuts phthalic output to 20% to 30% below the level obtained from naphthalene in the same units.

More development work is needed to improve yields of phthalic anhydride before *o*-xylene will become a serious competitor to naphthalene in U.K. phthalic plants. Scientific Design have stated that they have a catalyst capable of handling all three raw materials (CHEMICAL AGE, 25 June, p. 1067). U.S. prices are: coal-tar naphthalene, 6 cents/lb.; *o*-xylene, 6-6.5 cents/lb., 5 cents or less, for contracts; petroleum-based naphthalene, when available next year, is expected to be 5.7-6.3 cents/lb.

PHENOL WITHOUT BY-PRODUCTS

LIKELY to be more popular with European producers is a new route to phenol involving direct oxidation to benzene. Developed by Scientific Design, the process would enable production of phenol with practically no by-product materials—the problem associated with most existing phenol manufacturing processes.

The S.D. process differs from processes now in use or under consideration; whether liquid or vapour phase oxidation of benzene is involved, however, is not known. Vapour phase oxidation has been tried, but was abandoned because of poor yields.

There are five commercial processes for the production of phenol. The most recent is the toluene oxidation route. In the benzenesulphonate route, benzene, sulphuric acid and caustic soda react to form phenol, sodium sulphites and sulphates; this process is useful when the phenol plant is located near a paper mill which can take up the sulphites.

For the chlorobenzenes process—where chlorinated benzene is reacted with caustic soda and hydrochloric acid to give phenol sodium chloride and recycled diphenyl oxide—a source of low-cost chlorine is essential. For the Raschig process (in which benzene, air and water are reacted to produce phenol) to be economical, a large continuous operation is required; an advantage is that less than 0.1 lb. per lb. of phenol is produced as a by-product. (Hooker are modifying the Raschig process for their new Kentucky phenol plant.)

Finally, there is the cumene peroxidation process where cumene is oxidised to give phenol and acetone. In this process a ready market for the acetone is necessary.

Project News

Esso Plan 30,000 Tons/Year Butyl Plant at Fawley

ESSO Petroleum's decision to build a butyl rubber plant at their Fawley refinery and petrochemical site, about which rumours have been circulating for some months, has now been made public. The plant, with a capacity of 30,000 tons a year and costing £4.3 million, will meet all U.K. needs for a considerable period, and will also provide supplies for export.

Engineering design studies are now in hand, but no date has been set for the start of construction, which is expected to take between two and three years. Little additional labour will be required to operate the plant. At present butyl rubber used in the U.K. is imported from the U.S. and Canada.

No main contractors have been appointed as yet, but C. F. B. Braun of California and C.T.I.P. of Rome jointly handled construction of the most recently completed butyl plant—that at Fort Jerome, near Le Havre, which came on stream in December 1958 with a capacity of 20,000 tons/year. The first butyl plant, erected at Baton Rouge, La., has a capacity of 50,000 tons, to be extended by 30,000 tons. This was followed by the unit at Sarnia, Ont., with a capacity of 30,000 tons, and a plant at the Humble Oil Baytown refinery, with a capacity of 57,500 tons, due to be extended by 20,000 tons.

Thus the existing butyl plants have a capacity of 157,000 tons/year. With the new U.K. plant—the fifth—and expansion of the U.S. units, total butyl capacity will be 237,500 tons/year.

An anticipated large-scale use for butyl is in the manufacture of high-quality motor tyres. It is claimed that butyl rubber gives improved braking and road holding. Butyl is already widely used for the manufacture of inner tubes, and has also established itself as a general purpose rubber for electric cables, conveyor belts, tank linings and components.

● MAIN contractors for the £1 million project at Immingham, Lincs, of Fisons Ltd., to raise phosphoric acid production, to produce for the first time ammonium phosphate and to speed the turn-round of shipping, are the company's own engineering department. For further details of the project see CHEMICAL AGE, 9 July, p. 55.

● SIMON-CARVES LTD. have recently commissioned an Otto continuous catalytic reforming plant for the Guernsey Gas Light Co. to produce town gas from commercial methane. This is the first plant of its type to be installed in U.K., though there are some 28 in operation on the Continent. Gas-making was begun on 21 June, since when the plant has been in continuous operation, producing all the gas for the island.

Thermal efficiencies in excess of guarantee are being readily obtained and the gas is sulphur free. There are two completely independent plants, one of which is normally in operation to meet the whole of daily requirements.

● A CONTRACT for the design, construction and bringing into operation of the 450,000-tonnes-a-year Shell refinery to be built at Acajutla in El Salvador has been granted to the Haarlem firm of Fluor-Schuitvlot N.V. Equipment and plant for the refinery will be supplied mainly from Common Market countries.

I.C.I. Salt Division to Merge with Alkali

THE Salt Division of Imperial Chemical Industries Ltd. is to be merged with the Alkali Division, which has headquarters at Winnington, with effect from 1 January next. The merger is being made purely for administrative reasons and it may involve some reductions in the number employed. No redundancy, however, is anticipated since the normal retirement rate is expected to be sufficient to offset any reduction that may be necessary.

The company's general policy on the production and sale of salt will not be changed. The move is one of rationalisation for salt is one of the chief raw materials of the Alkali Division. The Salt Division has three works, producing salt at Winsford, Ches, at Weston Point near Runcorn, and at Stoke Works, near Droitwich.

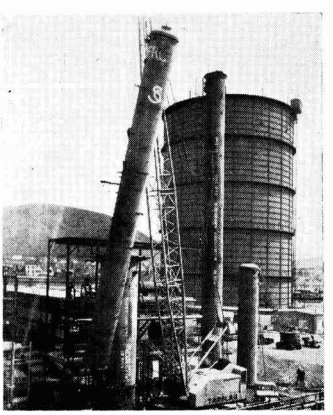
130-Ft. Port Talbot Distillation Column Erected with Tarslag Cranes

WORK is well in hand at the new hydrorefining plant for the Port Talbot Chemical Co. Ltd., who are jointly controlled by the Steel Company of Wales and the Lincolnshire Chemical Co. Recently two of the largest lorry-mounted cranes in the mobile lifting services division of Tarslag Ltd., one of 50-tons capacity, and the other of 25-tons capacity, travelled from the Rotherham depot to South Wales to erect a 130-ft. high distillation column plus ancillary plant at Port Talbot.

The distillation plant was designed by Lurgi of West Germany, manufactured by R. and J. Dempster Ltd., one of the two main contractors, and installed by Simon-Carves Ltd.

The preliminary column of the benzole distillation section comprises two vessels, the lower one of which is 5 ft. 9 in. diameter, 92 ft. 2 in. high, and weighs 33½ tons. The second vessel, which is mounted on top of the first, is 6 ft. 6¾ in. diameter, 38 ft. 3¼ in. high, and weighs 12 tons—making an overall height of 130 ft. 6 in. The benzole distillation section also has a side column which is 3 ft. 4 in. diameter, 81 ft. 10 in. high, and weighs 19½ tons.

The batch distillation section comprises a batch column, 5 ft. 9 in. diameter, 72 ft. 9 in. high and weighing 27 tons, mounted on a batch kettle which is 9 ft. 6 in. diameter, 40 ft. 6 in. high and weighs 28½ tons—making an overall height of 113 ft. 3 in.



Tarslag's 50-ton lorry-mounted crane lifts the batch column on to the batch kettle

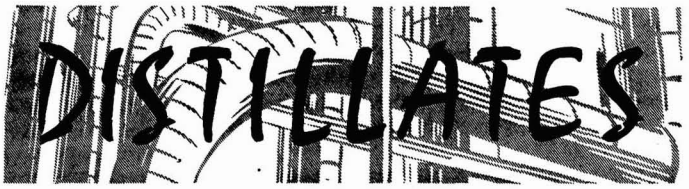
Fisons Not Bidding For Howards

FOLLOWING published rumours that Fisons Ltd. were bidding for Howards and Sons Ltd., Ilford (reported in CHEMICAL AGE last week, p. 235) Fisons have since stated that the company is not concerned in any negotiations with Howards. Howards and Sons stated that an approach had been made which might result in an offer for the company's ordinary shares; the name of the bidder was not disclosed.

Magnesium Oxide Freed from Export Control

CHANGES in export licensing control, effective on 22 August, which result from amendments to the list of goods subject to embargo for the Soviet bloc and China, include the removal from export control of magnesium oxide. The scope of control is reduced in respect of nickel alloys, germanium and refractory goods. Control of silicon is now reserved to destinations other than in the Commonwealth, Eire and the U.S.

Export control is imposed to countries other than the Commonwealth, Eire and the U.S. on certain electric vacuum furnaces and on ion vacuum pumps.



ALTHOUGH the Board of Trade appears to have left the door open to future action while rejecting for the present an application for anti-dumping duty on U.S. exports to the U.K. of monoethylene glycol, I cannot help feeling that their decision is wrong. There is no disputing the basic facts relating to these imports, and it is interesting to note that the B.o.T. statement is qualified by the comment "in present circumstances". It may be that one of the factors influencing the present decision has been a major reduction this year of imports from the U.S.

If this is so, it seems probable that should imports from the U.S. at dumped prices rise significantly, the B.o.T. would consider a further application by the U.K. producers of monoethylene glycol (Shell Chemical Co., I.C.I. and Union Carbide).

I think the Board of Trade was wrong for two reasons. Firstly the material has been coming into this country at not much more than £10/ton above the price of the domestic product in the U.S.—that plusage cannot possibly cover the cost of freight across the Atlantic and the U.K. duty of 33⅓%. Secondly, U.S. capacity is currently 600,000 tons/year—the U.K. production is not more than one-fifth of that figure. The U.S. industry is likely to have a serious overcapacity until at least 1962. In the meantime it needs only a few per cent of the total U.S. capacity to cause havoc to the economics of production in the U.K.

IT IS not often that an I.C.I. chairman takes a critical look in public—at Britain's chemical industry. That is why the survey of Mr. S. P. Chambers (see p. 279) is of such interest. In a frank article he suggests places where the industry might have been perhaps a little slow on the uptake, or where its record is not quite so well burnished as some statistical comparisons with other industries would indicate. He does not take a gloomy view of the coming decade and given reasonable stability, the 1960s should see further expansion and progress in the U.K. chemical industry.

Mr. Chambers refers to the fact that in most years plastics capacity tends to lag behind potential consumption. This, and Britain's slower growth rate in plastics compared with other O.E.E.C. countries combined, leads to his conclusion, in spite of mitigating factors, that the industry could have made even greater efforts to expand. Since his company is one of Britain's major producers, some may infer that I.C.I. are likely to take a bolder line in future.

By the end of 1951 Mr. Chambers sees U.K. polythene capacity, including a minor amount of polypropylene, exceeding 175,000 tons (75,000 tons in 1958). By 1970, U.K. should be producing about 1.25 million tons of plastics materials a year—an average growth rate of 8.7% compound a year.

SULPHURIC acid for I.C.I.'s projected £10 million ammonia, urea and fertiliser plants on Severnside, will not come from the large-scale acid facilities at the company's Billingham Division. This was stated recently by Mr. P. Mayne, division technical director. Describing a modernisation at Billingham which would cost "millions of pounds", he revealed that 1959 acid output of the new third kiln was a record, enabling a highest-ever production for the whole sulphuric acid plant.

The third kiln is one of the world's three largest making acid from anhydrite. The world shortage of sulphur when the kiln was built prompted Billingham to extend the kiln process. The situation is of course now vastly changed with a large new Mexican sulphur field, sulphur recovery at Lacq, and by recovery from crude oil. These developments have seen the price of sulphur come down to about two-thirds of what it was a few years ago.

If a new acid plant were to be built at Billingham today, said Mr. Mayne it would be a sulphur-burning unit. The kiln process is being continued because of the vast sums spent on it and because anhydrite is "so easily available and it still pays us to do so". In fact one of the Billingham kilns is to be re-built under a major programme for the overhaul of sulphuric acid plants.

A PAPER presented at a recent symposium at the Pennsylvania State University will interest most organic chemists for it dealt with efforts nearing successful completion at Cincinnati University to discover the composition of the Grignard reagent. Physical evidence shows, said Dr. R. E. Dessy of Cincinnati, that the classical compound RMgX does not exist, and that it is the stable complex $R_2Mg.MgX_2$.

Dr. Dessy intends to use nuclear magnetic resonance (NMR) in his work. Because it has not been possible to use this apparatus on Grignard reagents before, he has synthesised a fluorine Grignard, EtMgF, fluorine compounds being adaptable to NMR.

This is believed to be the 'first-ever' fluorine Grignard, and to achieve the end product ethyl bromide is reacted with elemental magnesium in ether. To this is added dioxane, which yields diethylmagnesium and a $MgBr_2.2$ dioxane complex. Treating this with MgF_2 yields, Dr. Dessy believes, the desired $Et_2Mg.MgF_2$ complex.

CONSIDERING that the corrosion of iron wastes millions of pounds every year, all over the world, it is tantalising that the basic cause of iron corrosion has remained largely a mystery. I hear that two research workers of the U.S. Westinghouse concern have now come up with a completely new theory, suggesting that the true cause is hydrogen ions, or protons, which penetrate the iron and enlarge the sites at which oxygen normally combines with the metal. This spreads the reaction throughout the surface of the iron, causing destruction by rust.

Until now, the standard explanation of iron corrosion has been that of an electrochemical reaction; if the new theory is correct, something more fundamental takes place in the iron, even though an electrochemical reaction may also be present.

In the experiments conducted by the two Westinghouse workers, Dr. E. A. Gulbransen and T. P. Copan, filament wires of pure iron were reacted with oxygen and water vapour at 835°F under closely controlled, idealised conditions. Corrosion phenomena were studied with an electron microscope. With dry oxygen the iron forms a protective oxide coating from which grow billions of microscopic oxide 'whiskers'. Substitution of water vapour for the dry oxygen atmosphere produced thin, blade-like platelets of iron oxide that spread across the metal surface. Less than one part of water vapour in 200 parts of dry oxygen will cause these blade-shaped crystals to form.

THE old adage that there is nothing new under the sun still seems to hold good—at least for some things. On 2 July I reported that Texas-U.S. Chemical Company had suggested a 'new name' for molecules built up of a few monomer units. The word was 'oligomer'.

Mr. Gilbert Thiessen of the Koppers Co. research department at Pittsburgh now draws my attention to a discussion of the terms, monomer, oligomer, polymers and segmers that was published in 1952—which makes the term a bit older than Texas-U.S. Chemical. For readers who are interested, this discussion appeared in pages 20-21 of 'Fundamental Principles of Polymerisation' by G. F. D'Alelio, a book published in London by Chapman and Hall.

Alembic

I.C.I. Chairman Sees U.K. Chemicals Growth as Neither Brilliant Nor Depressing

NEITHER brilliant nor depressing—that seems to summarise the performance of the chemical industry in the U.K. over the last seven years; even the huge capital expenditures of the 1950's have enabled the output of our chemical plants to do no more than keep pace with that of the chemical industry in other countries.

This revealing comment is made by Mr. S. P. Chambers, I.C.I. chairman, in an admirably clear and concise survey of the British chemical industry which appears in the current issue of the National Provincial Bank's *Review*, and in which he carefully analyses the available production figures for the chemical industry in Britain and other countries.

By taking the O.E.E.C. indices of production and supplementing them with comparable statistics from other sources, Mr. Chambers arrives at the following table:

Annual Growth Rates of Industrial Production and Chemical Production, 1953-59

	Industrial Production per cent.	Chemical* Production per cent.	Col. 2 divided by Col. 1
United Kingdom (7.3%) ...	3.5	5.6	1.6
U.S.A. (47.7%) ...	1.9	4.9	2.6
Canada (2.3%) ...	4.1	6.0	1.5
E.E.C. (21.0%) ...	7.8	11.5	1.5
W. Germany (8.4%) ...	8.8	11.9	1.4
France (5.8%) ...	7.9	11.4	1.4
Italy (4.6%) ...	8.0	13.1	1.6
Japan (5.3%) ...	13.7	14.5	1.1

* Including mineral oil refining and man-made fibres.

The table shows that the growth of the chemical industry in the European Economic Community and in the major countries which it comprises, has been roughly twice as fast as that in the U.K., the U.S. and Canada. Italy's performance is particularly striking, with a growth rate sustained at 13.1% per annum, and Japan has exceeded even this effort with a figure of 14.5%.

However, since the chemical industry is essentially a service industry which cannot grow faster than its market, the growth rate of the chemical industry relative to that of all industry must be taken into account. The third column of the table shows that the production of chemicals is proceeding half as fast again as industrial production both in this this country and on the Continent. By this test, therefore, the chemical industry in the U.K. seems to be performing more or less in step with its E.E.C. neighbours.

A more searching analysis of the British chemical industry's progress must take account of its different sectors separately, and Mr. Chambers went on to deal with the main groups of chemicals in turn. He pointed out that, although the large proportion of sulphuric acid output (2.5 million tons/year) used in fertiliser manufacture diminished the value of sulphuric acid as a general indicator of chemical industry trends, major changes in our economic circumstances are reflected in sulphuric acid consumption, which for the last 25 years has been rising at an average rate of 4.3% a year and shows no signs of slackening.

On the subject of plastics, Mr. Chambers drew attention to the tendency for manufacturing capacity to lag behind the potential consumption, which is considerably lower in this country per head of the population than in West Germany and still lower than that in the U.S. The U.K. plastics industry's record might lead one to think that the industry could have made even greater efforts to expand. However, it was not easy to forecast accurately what would be needed several years ahead.

A related field of endeavour is synthetic rubber, and here a critic of the chemical industry could argue that a profitable opportunity was seized rather tardily, for it was 11 years from the end of the war before the U.K. started manufacture of specialty rubbers, and another two years before any general-purpose synthetic rubber was made.

Taking the production figures for synthetic fibres and comparing them with the combined consumption of wool and cotton in the U.K. during 1959 (510,000 tons) it will be seen that the truly synthetic fibres are unlikely to overtake these natural fibres in volume of consumption during the 1960s, though *man-made* fibres as a whole (i.e. including rayon) may not be far off doing so.

Mr. Chambers's review of different sectors of the chemical industry brings out the important point that organic chemicals are likely to dominate the pattern of growth. This is not to say that investment in this field will be relatively more profitable than investment in plant for producing more traditional products, because competition in rapidly growing sectors is likely to be increasingly severe and heavy development costs limit profits.

Turning to exports, it is a welcome sign for our chemical industry that its percentage has been growing faster than that for the world; it is also agreeable that the value of our chemical exports rose by one-third between 1952 and 1958 and the volume even more; but what is unhealthy is that our *share* of the free world's chemical exports is slowly dropping. For instance, in 1958, 61% of Germany's chemical exports went to areas undergoing vigorous economic expansion—i.e., the more industrialised areas of the world—compared with only 36% of U.K. exports. Mr. Chambers thought that Britain must try to get more firmly established in European markets, which from several points of view was a very satisfactory market for chemicals. This would be made more difficult unless negotiations between the 'Six' and the 'Seven' lead to a greater freedom of trade between the two groups. Another worthwhile market was the Soviet bloc; the greatest opportunities at the moment lie with the technologically complex products which are showing the fastest growth rates at home, e.g., plastics.

P. Leiner and Sons to Set Up Gelatine Plant in India

A GELATINE factory is to be set up in India by P. Leiner and Sons, Ltd., Treforest, Glam, as part of their expanding world trade. The new company, Leiner-Knit Gelatine Co. Ltd. will produce 2,000 tons a year of edible, pharmaceutical and technical gelatines, and also bone glue, using sinews for the raw material.

This is the first venture of its kind in India and strengthens the link in Anglo-Indian commerce which Leiner's have already promoted by their bone-crushing factory at Jodhpur. The new company has an authorised capital of 50 lacs of rupees (£375,000) and the shares are held jointly by Jeiner's and K.N.I.T.—the Kapurthala and Northern India Tanneries Ltd., in Kapurthala. Directors are L. Leiner and R. G. Egan, respectively chairman and managing director of P. Leiner and Sons, and P .R. Sodhi and F. C. Kapur.

Factory site has yet to be chosen, but production is planned to start in about six to nine months time. Technical experts from Treforest will go to India to organise the new plant. One of the main products will be gelatine for bank-note paper. Most of the bone glue produced will be exported to the U.K.

The Treforest factory of P. Leiner and Sons has the world's largest output of ossein gelatine. It is also the largest single U.K. producer of gelatine of any kind.

I.C.I. Deny Rumours of Large New Runcorn Plant

Rumours circulating in the north-west to the effect that I.C.I. were planning to build a large new plant at Runcorn were denied on 8 August. Speculation started when the General Chemicals Division purchased a section of Moor Marshes from the Manchester Ship Canal Co. This is strictly for the dumping of waste materials from the Castner Kellner plant. A division spokesman said "We are not planning any full-scale extensions yet".

M.C.A. President as Speaker at A.B.C.M. Dinner

Chief guest at the annual dinner of the Association of British Chemical Manufacturers, to be held at Grosvenor House, London, on 12 October will be General John E. Hull, president of the Manufacturing Chemists Association of the U.S.

D.C.L. Industrial Group, Has 27% Rise in Earnings and Accounts for 20% of Profit

INDUSTRIAL Group of the Distillers Company Ltd. had a satisfactory year with a 27% increase in earnings, says Sir Graham Hayman, chairman, in his annual report. The return on capital employed is said to compare favourably with the group's leading competitors. The contribution of the Industrial Group to D.C.L. profits was of the order of 20%. As stated in 'Commercial News,' a one-for-five share issue is planned.

Group trading profit was £30,419,758 (£24,989,991) and income from trade investments £2,373,590 (£1,788,997). The credit for the increase can be broadly apportioned between D.C.L's potable and chemical interests in the proportion in which they contributed to profits in the past, the major potable interests showing an increase of about £4,500,000 and the industrial divisions, including their part of income from trade investments, recording an advance of well over £1 million.

The net income from trade investments was more than accounted for by a higher dividend from British Hydrocarbon Chemicals Ltd.; other trade investment income was down, due to the tax position of an associate company, where the results were in fact satisfactory.

Chemical Sales Up

The Chemical Division had seen a substantial increase in sales of all products, with a corresponding improvement in earnings. Carbon dioxide had a record year. Butanol production was fully re-established at Hull and the new phthalate plasticisers plant was in full operation. The new acetic acid plant, using a new D.C.L. process, should give significant economies in production costs. Murgatroyd's Salt and Chemical Co., now installing a large chlorine extension, had a satisfactory year.

The new B.H.C. polyethylene plant presented a number of teething problems; these were now being steadily overcome and production of specification material was fully established. The other two new plants—for cumene and phenol—were operating to full capacity. The new 70,000 ethylene plant was successfully commissioned in June. Sir Graham also referred to the three further projects in hand for a substantial extension to butadiene capacity, and new plants for methanol and ethylene dichloride.

The two B.H.C. subsidiaries—Forth Chemicals and Grange Chemicals—both had very good years and Forth Chemicals should have a further monomer styrene extension on stream by the end of 1960.

The Plastics Division had an "exceptionally busy year". Demand for p.v.c. was still increasing and British Geon had in hand a further substantial capacity rise; production of Hycar oil-resistant rubbers was also to be raised. B.H.C. Rigidex polyethylene marketed by British Resin Products, was finding increasing acceptance in new fields. To meet higher sales, Distrene had raised their production of polystyrene. The associate, B.X. Plastics, had a good year with higher earnings.

In the Biochemical Division, which increased its sales volume, special efforts were being made to discover new products and some progress was being made. Low-prices in world markets had led to substantially reduced margins.

In Australia, the associate, C.S.R. Chemicals, continued to make good progress and a joint company had been formed with B.F. Goodrich to produce p.v.c. resins at a new plant near Melbourne. C.S.R. were also associated with the Dow Chemical Co. and plans were in hand to produce styrene, chlorine and ethylene dichloride.

The associate, National Chemical Products, had a record year in South Africa both in turnover and profits. Their subsidiary, Poly-Resin Products, were nearing completion with a new resin plant in Durban to replace that destroyed by fire. A joint company had been set up with the South African Coal, Oil and Gas Corporation to make chemical derivatives from raw materials provided by the parent companies.

If a favourable level of national activity was maintained, the new developments should in due course lead to increased earnings for the D.C.L. Industrial Group, declared Sir Graham. The Common Market posed difficult problems which could not yet be accurately measured.

Leybold—Elliott Automation Link to Exploit High Vacuum Techniques

A LINK between Leybold's of Cologne, high vacuum engineers, and Elliott-Automation Ltd., 34 Portland Place, London W.1, has led to the formation of a joint company, Leybold-Elliott Ltd. Elliott will have a majority interest in this new U.K. company, which is to have an initial issued capital of £100,000.

Leybold-Elliott will exploit throughout the Commonwealth, except Canada, the industrial vacuum process equipment of both its parent groups, and by combining the complementary knowledge and experience of Leybold and Elliott, will expand the range of products still further. By a reciprocal agreement these products and those of Elliotts may be marketed in certain countries in Europe by the Leybold companies.

The new company will take over the representation of Leybold interests in this country for industrial equipment from Leybold Vacuum Sales Ltd. Leybold-Elliott are holding a three-day exhibition of their products at the end of September in the London area at which the applications of high vacuum techniques will be discussed. Invitations can be obtained from Leybold-Elliott Ltd., c/o Elliott Brothers (London) Ltd., Elstree Way, Borehamwood, Herts.

Geigy's New Optical Brightener for Plastics

RESEARCH by Geigy has led to the production of Tinopal PGP, an optical brightening agent for plastics, which has a greenish blue fluorescence. Bulk quantities will be available shortly. When Geigy introduced Tinopal PCRP in 1956, the first optical brightener for plastics, the product was characterised by a reddish blue fluorescence, but for some applications requests have been received for a product with the same heat and light stability, but with a greenish blue fluorescence.

This is of particular advantage when, for example, anatase titanium dioxide is used to produce the purest white possible in p.v.c., polystyrene or cellulose acetate. Light fastness is particularly high in transparent grades of p.v.c., polystyrene and polythene and in transparent and opaque grades of cellulose acetate. It is better than Tinopal PRCP in opaque grades of p.v.c., polystyrene and polythene. Light fastness is only moderate in polyester resins and polymethylmethacrylate resins.

When using Tinopal PGP in polythene, care should be taken to avoid blooming and the concentration should not be higher than 0.01-0.03%.

Very small amounts of Irgalite pigments used with Tinopal PGP are said to be extremely effective in transparent p.v.c. and cellulose acetate films and transparent polystyrene sheeting. In opaque films considerably brighter colorations are obtained in combination with anatase titanium dioxide; yellow and green pigments give particularly pleasing effects with Tinopal PGP. With red and blue pigments it is better to use Tinopal PCRP.

Wilson Report on Coal Derivatives

Lurgi Process is Most Promising Route to Gas from Coal

MAIN theme of the report of the Ministry of Power Committee on Coal Derivatives, published last week (H.M.S.O., 4s net) is the complete gasification of coal. The Lurgi process, with enrichment from petroleum sources, is seen to be the most promising of the new methods of producing gas from coal more cheaply than by conventional coal carbonisation. Expansion of Lurgi gasification, however, will depend on the ability to generate large volumes of gas at favourable sites. Major factor in this expansion would be a national grid, possibly linked with underground storage.

Further improvements in gasification techniques should follow the successful development of high-pressure slagging gasifiers. It is recommended that the Gas Council should be responsible for development work on these gasifiers and any other gasifiers primarily suitable for town gas. The work on slagging gasifiers was started with a view to studying the production of oil from coal. The prospects of making oil from coal commercially,, however, are so remote that development work on the Fischer Tropsch process now in hand at the Warren Spring Laboratory, Stevenage, should be rounded off.

So far as carbonisation chemicals are concerned, the committee sees as the industry's main problem that of producing chemicals at a competitive price and finding outlets for them. Continued work is needed on the extraction of such products as benzene and naphthalene; a large expansion in the use of aliphatics will not see a proportionate increase in the use of carbide. It is recommended that work be pursued on certain speculative processes, including hydrogenation of coal to produce aromatics; alkaline hydrolysis of coal to produce phenol; and fluorination with chlorine trifluoride to give fluorocarbons.

The committee also considered industrial gas and felt there was scope for further improvements in the design of single-stage gas producers. Further work should also be done on ways of increasing the variety of coals that can be used in two-stage gas producers.

Committee's Terms of Reference

The committee was appointed in April 1959 to review work done in recent years on the development of processes in which coal is the basic raw material and which would produce marketable products of a gaseous or liquid hydrocarbon type; and to make recommendations as to the direction of further research and development work processes which appeared to hold promise of industrial application and as to the type and as to the organisation best suited to carry out such work.

Chairman of the committee was Mr. A. H. Wilson, F.R.S., deputy chairman and managing director in charge of research of Courtaulds Ltd.

Other members were: M. A. L. Banks (director, British Petroleum); Henry Benson, C.B.E. (chartered accountant); H. E. Collins, C.B.E (National Coal Board member for production and reconstruction); Captain (E) W. Gregson, C.B.E., R.N.R. (chairman, Minister of Power's Fuel Efficiency Advisory Committee); Dr. R. Holroyd, F.R.S. (a deputy chairman of I.C.I.); W. K. Hutchison, C.B.E. (deputy chairman, Gas Council); Dr. M. A. Matthews (planning co-ordinator, Shell International Chemical Co. Ltd., director, Shell Chemical Co. Ltd.); and B. E. A. Vigers (deputy chairman and technical director, Laporte Industries Ltd.).

Assessors to the committee were: S. H. Clarke, C.B.E., and Dr. C. C. Hall (both of the Warren Spring Laboratory, D.I.S.R.); and D. A. B. Llewelyn (Ministry of Power).

The main sections of the Wilson committee's report, and the various recommendations made by the committee are summarised below.

Under its terms of reference, the Wilson recommends the following process research and development work in the coal derivative industries:

- **Development of high pressure slagging gasifiers should be pursued.**
- **Potentialities of coal hydrogasification should be assessed with a small-scale pilot plant.**
- **Gas Council's new experimental Otto-Rummel double-shaft gasifier is welcomed.**
- **As Fischer Tropsch work tails-off, Warren Spring should study catalysts and the CO/H reaction; and interaction between gases and solids in catalytic reactors.**
- **Continued work is needed on extraction of benzene and naphthalene, plus work on 'speculative' chemicals from coal processes.**

Coal Tar Could Support Chemical Industry of Twice the Present Size

WITH a few important exceptions, it is clear states the Wilson committee that in the foreseeable future there will be ample supplies of chemicals not at present extracted from coal tar but which might be extracted to support an expansion of the chemical industry up to twice its present size. Such increased output, however, will have to be competitive with the corresponding products from petroleum.

The U.K. usage of home-produced primary chemicals based on carbonaceous raw materials in 1958 was about: 1 million tons of organic chemicals; 600,000 tons of ammonia; 150,000 tons of other inorganic chemicals, mainly carbon disulphide and carbon dioxide. About 60% of this total was ultimately derived from coal. In 1958, 28 million tons of coal were carbonised in coke ovens, and 25 million tons in gas works, giving rise to 85,000 tons of ammonia, 475,000 tons of crude benzole and 3 million tons of tar. The crude benzole was used for the production of 136,000 tons of chemical benzene; 33,000 tons of toluene, 16,500 tons of xylenes and 166,000 tons of motor benzole.

Table 1 shows the annual production of chemicals extracted in reasonable quantities from tar, with the maximum quantities that could theoretically be produced. In general the problem facing the tar distillation industry is that of producing chemicals at competitive prices and finding sufficient outlets. The only major chemical, apart from *p*-xylene, derived from coal that is not obtained in sufficient quantities is phenol. The extra phenol needed is obtained by synthesis from benzene and is estimated by the committee to amount to some 60% of total production.

It is the general opinion in industry that the supply of coal tar and benzole will increase slightly during the next 10 years. Although demand for aromatics is generally rising, the increases forecast are by no means the same for each chemical and demand for some may remain more or less stationary.

TABLE I
Production of chemicals from coal tar in 1958

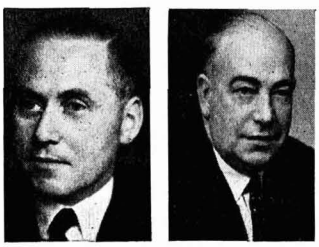
	Actual '000 *tons*	*Potential* '000 *tons*
Solvent naphtha	40.0	40.0
Phenol	16.0	18.0
Cresols & xylenols ...	70.0	95.0
Naphthalene	57.5	170.0
Anthracene	2.5	20.5
Indene & coumarone ...	2.5	13.5
Pyridine & picoline ...	1.0	4.0

Supply and demand for cresols are more or less in balance and, if more cresols are needed in the future, they will be synthesised from toluene or replaced in some end-uses by phenol. Demand for benzene is increasing and looking some years ahead new sources of supply will be necessary; in the meantime continued work is necessary on ways of extracting a higher proportion of benzene from motor benzole.

Demand for naphthalene is also increasing and the amount extracted from coal tar could be increased without in-

Large-scale Processes Needed for Phthalic Production by Unconventional Methods

volving considerable extra costs; but a major output rise might prove expensive. The main outlet for naphthalene is for the production of phthalic anhydride and there are various other routes by which phthalic can be made—*o*-xylene, α- and β-methyl naphthalenes and from phenanthrene. U.K. annual output of coal tar at present contains about 170,000 tons



A. H. Wilson, F.R.S., chairman of the committee, left, and Dr. R. Holroyd, F.R.S., a member

of the last three chemicals, a proportion of which could be extracted if required. Large-scale processes for making phthalic from some of those unconventional sources have not, however, been fully worked out and it might be necessary to pay some attention to their development in the future.

Chemicals from Acetylene. High costs of electricity had limited the production of carbide in the U.K. and while total usage in 1958 was 219,000 tons, some 74,000 tons were imported. At present, U.K. aliphatic chemical needs can be divided roughly into those produced from olefin gases and those based on acetylene; the former are much the more important not only in quantity but also in growth rate.

U.K. consumption of primary olefins in 1958 was 406,000 tons, comprising 168,000 tons of ethylene, 165,000 tons of propylene and 73,000 tons of higher olefins. They were mainly used for producing solvents (137,000 tons); thermoplastics and plasticisers (92,000 tons); synthetic detergents (77,000 tons); synthetic rubber (20,000 tons) and miscellaneous (80,000 tons). The total usage of acetylene was 48,000 tons/year, equivalent to a coal usage of 150,000 tons.

It is anticipated that the use of acrylonitrile will increase with the expansion of acrylic fibres, but its production in the future might well be based on propylene rather than on acetylene and there is a strong possibility of vinyl chloride made from ethylene competing with that based on acetylene. There are also oil routes to acetylene which might prove cheaper than the carbide route. Therefore, although there will be a large expansion in the use of aliphatics in the next 10 years, the use of carbide might not increase proportionately.

Chemicals from Synthesis Gas. In addition to the 85,000 tons of by-product ammonia produced in 1958, 500,000 tons of ammonia were made from synthesis gas and the total amount of coke used in the syntheses of all types was about 900,000 tons, requiring about 1,350,000 tons of coal.

Requirements of ammonia, methanol and other organic products continue to grow and by the late 1960s synthesis gas needs can be expected to be about double the 1958 figures.

While most of the synthesis gas needs of the chemical industry are at present made from coke, more economic methods of production are either available or under development. Many of the technical problems facing the chemical industry are basically the same as those facing the gas industry in its study of gasification processes. Gas specifications, however, are not the same; for ammonia synthesis a mixture of very pure hydrogen and nitrogen is wanted, while for methanol synthesis, the H/CO ratio must be 2:1.

The choice of gasification process to make substantially pure hydrogen will be decided in the light of the relevant industrial and commercial considerations, but the committee's studies suggested that at present the cheapest process will be the steam reforming of light naphtha. The only immediate alternative is the partial oxidation of fuel oil. The competitive position of coal might be improved in the long term through the work recommended by the committee on Lurgi gasification and on the slagging coal gasifiers.

Speculative Processes. The committee discusses speculative research on a number of topics to which limited attention could, it is thought, be given. For instance the hydrogenation of coal under conditions designed to produce aromatic chemicals; the alkaline hydrolysis of coal to produce phenol and organic acids; the oxidation of coal by agents such as nitric acid, potassium permanganate, ozone and oxygen to give organic acids; the fluorination of coal with reagents such as chlorine trifluoride to give fluorocarbons; and the extraction of coal with certain organic solvents to give products that might be further hydrogenated to produce aromatic compounds.

Such work could best be carried out at universities, colleges of technology or in some cases at research associations. None of the processes, however, is likely to lead to any large-scale uses of coal. One development that could possibly lead to the consumption of appreciable quantities of coal, says the committee, is the reaction of steam with coal at very high pressures to give synthesis gas. Basic work on the reaction is in hand abroad and it is being considered by the Gas Council; it is recommended that this speculative work should be continued.

The usage of coal as such for chemical processes, other than those based on carbonisation by-products, is about 1.5 million tons/year; even if all existing and future synthesis gas and acetylene production are based on coal, total demands for that purpose would be only about 2.5 million tons/year by the late 1960s.

Work on Slagging Gasifiers Might Give Advantages Over Lurgi

THE committee was informed by the Gas Council that if sales of gas, static for many years, were to be increased effectively, the cost of producing town gas should not be more than 10d/therm, including capital charges and that it should preferably be substantially less. Studies made of a Lurgi installation in the East Midlands gave a net cost of town gas (after deducting 1.5d/therm of gas for receipts from by-products) as 8.59d/therm. Of that the cost of coal and butane represented 3.68d and 2.75d respectively, while capital charges accounted for a further 2.02d.

Although the cost of production was sufficiently low to be attractive, it was unlikely that every Lurgi plant would have costs as favourable as the complex studied. In fact the cost was only achieved by considering a very large plant sited on a coal field and operating at a load factor of 86.5%. If the load factor of the plant studied fell to 70%, then the cost of gas would be increased by about 0.8d/therm.

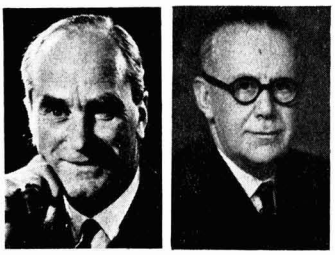
Expansion of Lurgi gasification would depend on the ability to generate large volumes of gas at sites where conditions are favourable and on cheap distribution to centres of consumption 100 to 200 miles distant. (Lurgi plants are in hand at Westfield, Scotland, and at Coleshill, Warwicks.) According to the National Coal Board, suitable sites for other plants from the point of view of coal supplies would be: two plants in South Yorkshire, one in North Derbyshire, two in Nottinghamshire, and one in Leicestershire.

Development of a national grid, possibly linked with underground storage, would be a major factor in the expansion of Lurgi gasification.

The production of town gas via the methanation reaction was ruled out on account of costs. Another process, the hydrogasification of coal, was in an early stage of development and it was recommended that the present work at the Gas Council's Midland Research Station be continued on a small pilot plant so that its potentialities could be assessed. In this process, coal pre-heated to about 500°C, is hydrogenated with fresh hydrogen at about 900°C and at pressures between 30 and 50 atm. Further pilot plant work is recommended because experiments have so far been carried out in a batch hydrogenator, while for indus-

trial processes a continuous fluid-bed process would be needed.

When the Lurgi plants now being built are completed considerable development will be needed to bring them to maximum efficiency on British coals. One subject of particular interest is to increase the pressure of gasification.



W. K. Hutchison, left, and B. E. A. Vigers, two members of the committee

Slagging Gasifiers. To have a better performance than a Lurgi unit, a new gasifier should satisfy the following requirements:

1. It should have a large output per gasifier unit so as to minimise capital costs.
2. It should be able to use a wide range of coals, including those of high ash content and having an ash that fuses at low temperature.
3. It should use as little steam and oxygen as possible and it should produce little effluent.
4. It should have a thermal efficiency comparable with that of the Lurgi unit.

Fixed Bed Experiments

To meet these needs, work is in hand on high pressure slagging gasifiers that utilise a fixed bed and thus allow heat exchange to take place between the incoming coal and the products of gasification and in which the temperature is allowed to rise above the fusion point of the ash by limiting the steam content in the blast. By this means the ash is liquefied and can be removed as a slag and quenched in water.

Although the development of a high pressure slagging gasifier is at an early stage, the principle shows promise of considerable advantages. The time required for developing the gasifier to a stage at which a prototype of a full-scale plant could be designed would be at least five years; to bring the project to that stage a further £2 million would be needed. If successful, the work would lead to a gasifier with the following advantages over the standard Lurgi: Specific throughput would be raised, a greater variety of coals could be used; the effluent problem would be substantially reduced.

It was recommended that the Gas Council should be responsible for further work on the standard Lurgi gasifier using British coals and on any other gasifiers suitable for town gas. The Council should also handle development of slagging gasifiers, although it would not be easy for them to take over the work at present sponsored by the Ministry of Power on slagging gasifiers.

Discussing the Otto-Rummel double-shaft gasifier, designed to operate continuously with air, the committee says the process is in an early development stage and that the use of slag as a heat-transfer medium presents considerable difficulties. The hydrogen-carbon monoxide ratio in the raw gas may be about 1.1:1. If the technological problems can be solved, the cost of raw gas is likely to be commercially attractive.

The Gas Council has decided to install an experimental double-shaft gasifier with a capacity of about 2 million cu. ft./day. Since the process does not use oxygen, it might be used for installations not large enough to require an oxygen plant of an economic size. The Gas Council's decision to go ahead with the project was endorsed by the committee.

No Future for Oil-from-Coal, So Work on Fischer-Tropsch Should End

THE report includes a lengthy review of the known processes to produce hydrocarbon oils and chemicals from coal. The only plants operating today are those of SASOL in South Africa which uses the Ruhrchemie AG fixed bed process with an iron catalyst, and three small plants in Europe, one in Poland and two in East Germany.

The SASOL plant, completed in 1955, was designed to produce some 250,000 tons/year of petrol, diesel oil and chemical products by the Fischer-Tropsch process. Continuous plant operation has only recently been achieved because of the severe technical difficulties. Output, however, is appreciably below the original design figure, but additional plant is about to be installed which should raise production to a level somewhat above that figure.

After charging depreciation of about £1.3 million, the plant operated at a loss of about £400,000 for the year ended 27 June 1959 (before providing any return on capital invested). Profitability of the plant would, it was thought, depend very greatly on the revenue obtained from the sale of refined waxes and chemical products. Production of these by-products could be absorbed in South Africa where there is no other source of these or similar materials.

The committee describes the Ministry of Power studies of gasification for the production of oil from coal. This major undertaking is still in its early stages, but it has become apparent that the use of a large proportion of fine coal would seriously reduce throughput.

A synthetic gas, with a high proportion of carbon monoxide, such as is produced in a slagging gasifier, has economic advantages when used in an oil synthesis plant. Yield of oil relative to gas is at a maximum, unwanted by-products are minimised and the need for tail-gas recirculation avoided. The only known version of the Fischer-Tropsch process that would accept a gas of such a low H/CO ratio is the Rheinpreussen slurry process, as yet not completely developed. This process is flexible not only so far as feed gas is concerned, but also the range of products. Even ignoring those advantages, the process shows promise of being less costly than other versions of the synthesis method.

Although the slurry synthesis has only been operated on a pilot scale, it was decided to assume that it could be developed into a fully commercial process. The D.S.I.R. Warren Spring Laboratory is investigating this process. A promising iron oxide catalyst prepared from ferrous sulphate, containing small amounts of copper and alkali, has been developed. Work is in progress to determine the effect of variation in the H/CO ratio and of variation in operating pressure on the performance obtained in slurry process.

Studies undertaken by the committee show that oil products could not be made from coal in the U.K. in commercial quantities in the foreseeable future without a large annual subsidy. The cost of synthesis gas is about 70% of the total cost of making oil from coal and, since slagging gasifiers offered the best hope of reducing the cost of synthesis gas, the results of this development would provide a firm foundation in the future for a better assessment of the economics of making oil from coal.

A memorandum prepared by I.C.I. on the hydrogenation of coal is included as an appendix to the report. It discusses the history of the process and its development by I.C.I. While the process was barely paying its way in 1938, to-day there would be a deficit of 10½d per gallon of petrol before paying any distribution and marketing costs.

Possible improvements in synthesis processes could only have a marginal effect on the economics of an oil-from-coal plant and since the technology of the synthesis was many years ahead of a possible breakthrough in gasification —which alone could make oil synthesis viable—it is recommended that the D.S.I.R. work on slurry synthesis should be wound up in about 18 months when the objectives have been attained.

Other Warren Spring Laboratory studies should be intensified as work on the Fischer-Tropsch process is tailed off. It is recommended that subjects for study should be basic research on catalysts and on the mechanism of the reactions between CO and H; and chemical engineering studies of the interaction between gases and solids in catalytic reactors, with a view to improving reactor design.

Such studies were not only likely to lead to results of importance in catalytic reactions in general, but they might open new routes for producing certain chemicals. If further work on oil-from-coal processes seemed desirable in the future, it could be restarted with the minimum of delay.

Advances in Control of Metal and Chemical Fires

ADVANCES in the control and extinguishing of combustible metal and special chemical fires were described recently by Mr. Edmund D. Zeratsky of Ansul Chemical Co., Marinette, Wisconsin, at the 64th annual meeting of the U.S. National Fire Protection Association. Mr. Zeratsky discussed two approved powdered agents for combustible metal fires as well as unapproved agents for metals and pyrophoric liquids such as triethylaluminum.

He first spoke of G-1 and Met-L-X, the two approved powdered agents for combustible metal fires. G.1 (graded granular graphite, plus phosphorus-containing compounds) is applied by shovel or scoop, but Met-L-X is approved for use in extinguishers. Either agent will extinguish magnesium fires and uranium fires which are similar to, but more severe than, fires in magnesium. Met-L-X is composed of a sodium chloride base with additives to make it free flowing and cause heat caking. The additives include tricalcium phosphate to improve flow characteristics and metal stearates for water repellancy. A thermoplastic material is added to bind the sodium chloride particles into a solid mass under fire conditions.

Fire tests with dry and oily titanium turnings found G-1 more effective than Met-L-X, pound for pound. Both agents also extinguished fires in zirconium chips and turnings coated with an oil-water coolant, but when chips were moist, the fires were only controlled.

Fires in sodium could be extinguished with either agent as could spill fires in potassium and sodium-potassium alloy. Met-L-X was recommended only for lithium spill fires, not for lithium fires in depth. G-1 was satisfactory for both types of lithium fires.

Mr. Zeratsky also discussed another unapproved dry powder developed primarily for extinguishing lithium fires. It was found valuable for the control and extinguishment of fires in pyrophoric liquids. For producers of triethylaluminium, tests were conducted to evaluate various extinguishing agents. This led to the development of a special dry chemical—a mixture of a bicarbonate-base dry chemical and an activated adsorbent.

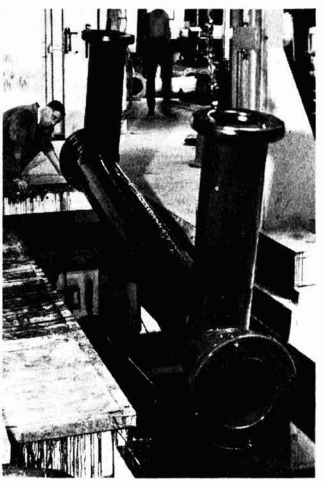
Snell-Sondes Place Research Collaboration

AT THE start of the second decade of Transatlantic research co-operation, Sondes Place Research Institute of the U.K. and Foster D. Snell, Inc., of the U.S., both independent chemical and engineering consulting organisations, look back on a number of achievements and forward to mutual ventures which may pay great dividends.

Both organisations felt at the time the arrangement was made that economic and technological developments following the war would open up many opportunities. This has proved to be the case. Increasing numbers of U.S. corporations have established branches or acquired associates in the U.K., and considerable advantage is to be had by channelling the research problems of these overseas associates into local research organisations, since research services are offered in Europe at a lower cost and European scientists and technicians often bring a fresh point of view to the problem. Many of the same advantages are gained by Europeans conducting their research in the U.S. The American research firm can offer great assistance in fitting European products to the U.S. market, and in providing solutions to new problems which may be encountered there.

Dr. Snell sums up the co-operative work of the two organisations by saying that, as a generalisation, Europeans tend to be stronger in basic research while Americans tend to be stronger in applied technology and an arrangement such as that which exists between Sondes Place and the Snell Corporation enables the clients of both to be offered the advantages of both forms of experience.

Salt Water Pipeline Coated in P.V.C.



Believed to be the first application of its kind, a 14 in. salt water pipeline has been dip coated, ⅛ in. thick, with Vylastic RS p.v.c., to give protection against corrosion and abrasion. Photo shows part of the pipeline coming out of the dip. P.v.c. dipping gives a coating with excellent adhesion to the substrate metal and a seam-free lining to intricate bends, thus improving flow properties and reducing turbulence. The dipping was carried out by Plastic Coatings Ltd., Guildford, Surrey, using Vylastic based on Geon 121 p.v.c. paste resin

I.C.I. Raise Sodium Fluorosilicate Capacity by Over 50%

WITH the commissioning of a new plant at Billingham, Co. Durham, I.C.I. have raised their capacity for sodium fluorosilicate (Na_2SiF_6) by more than 50%. Production, it is thought, will now be sufficient to cover all U.K. needs, without the necessity to import. Associated with recent extensions to Billingham Division's production of compound fertilisers, the new plant was designed by I.C.I. staff.

Largely used in the glass, vitreous enamelling, light alloy and rubber trades, sodium fluorosilicate has been in short supply for many years and substantial quantities have been imported. Other U.K. producers are R. Cruickshank Ltd. and James Wilkinson and Son Ltd., one of the Laporte group. In addition, Albright and Wilson and Hopkins and Williams manufacture the finer grades.

A white, finely crystalline product, sodium fluorosilicate, is odourless, non-volatile and only sparingly soluble in water. In constitution, it resembles cryolite, for which it is an effective alternative in some applications.

The I.C.I. product is supplied in 1-cwt. hessian bags lined with bitumen paper. It is used as a partial opacifier in the production of vitreous enamel frits and opal glass, as a flux in the melting of light alloy scrap, as a coagulant for rubber latex in the manufacture of foam rubber, as a reagent for the extraction of beryllium from beryl, and in the extraction of rare earth metals, in the fluoridation of water supplies, and as a laundry 'sour.'

Simon Engineering Merge Precipitation Activities

THE Electrical Precipitator Division of Simon-Carves Ltd. is being transferred to Birmingham, and after 1 September its address will be: Simon-Carves Ltd., George Street Parade, Birmingham, 3.

This move will concentrate in one place activities of Simon Engineering in precipitation work. Lodge-Cottrell already operate from this Birmingham address, and the integration and closer cooperation should benefit customers.

Simon-Carves and Lodge-Cottrell will continue to offer the same range of designs and services as they have in the past.

New Non-rubber Elastic from U.S. Rubber

A NON-RUBBER elastic, made from Vyrene, a silicone lubricated polyester monofilament, is to be manufactured by Lastex Yarn and Lactron Thread Ltd., an associate of the Dunlop Group and of the United States Rubber Co.

Vyrene, discovered by U.S. Rubber, can be spun into threads of extremely fine gauge, and in spite of its fineness has remarkable resistance to the effects of sunlight, oil and perspiration, and withstands laundering and dry-cleaning. Covered with nylon and other textile fibres, it has already been successfully marketed in the U.S.

SAFE METHODS IN CHEMICAL PLANT OPERATIONS

IN dealing with reactions in closed vessels, it is desirable during pilot plant stage, that a recording pressure gauge be fitted in preference to an indicating type. A chart from such an instrument will be of valuable assistance in deciding what size of safety device should be put in. It is quite usual to put in a bursting disc or a safety valve which will operate at 10 lb. per sq. in. above the normal working pressure, but if an action takes place which causes a very rapid rise in pressure, the safety device may not be sufficiently large to release the pressure in time, the result being either a pressure burst or an explosion which, in either case, may have serious effects.

Periodic Swirling

Unexpected Effects. A case arose in the writer's experience which may be worth recording. In this particular instance, large batches of thin slurry were stirred in wooden vats fitted with a relatively small revolving stirrer and two baffles fixed to the top part of the walls of the vats to break up the circular motion. The slurry was fed into the vats and diluted with water and then stirring was continuous in order to prevent the solid matter from settling out. The stirrer was started as soon as filling commenced and as the vat filled a swirling motion developed, usually fairly suddenly. This motion was periodic and at times caused the vats to sway appreciably. At the time, there seemed no obvious explanation, but on reflection one comes to the conclusion that the positioning of the baffles was a direct cause of the trouble. The motion produced was certainly the cause of some uneasiness among workers not used to this effect. It caused some apprehension at times in those who were in charge of the plant. The only solution was to stop the motion and then start again. The movement of the stirrer was not fast enough to produce an appreciable vortex but as the vat filled there was a tendency for the wave to rise sufficiently to let the liquid come over the top of the vat. There is no easy cure for this sort of thing. Clearly the vessels must be of adequate size and must be firmly secured if there is any chance of movement. Points like this will usually become apparent during pilot plant operations, and can be taken care of in the final design stage. This example is put into this article largely to indicate what may prove a source of alarm to an inexperienced workman. Points of this sort may come up during the course of pilot plant working and, if they do, it is well to guard against them.

Transporting Liquids Through Pipelines. This presents many difficulties and most readers of this journal will be familiar with the troubles that can arise when a small piece of grit gets itself embedded in the seating of a valve, particularly if it is so very small that the gap produced is almost but not entirely negligible. If the pipe leads from the top of a tank there is always a chance of a syphon being formed, when a small flow will continue until stopped. It is quite sound practice to insert a small air valve at the highest point of the pipe so that air can be let into it to break any syphon which may have formed. Small continuous flows of this type can make pipe-jointing a dangerous operation. It might be thought to be unnecessary to stress the importance of ensuring that liquids are not enclosed in pipelines, with no air spaces, which are closed at both ends. The pressure developed by the expansion due to normal changes of temperature between night and day, however, is sufficient to cause serious damage. The number of accidents caused by this effect justifies the mention of it. Viscous liquids take some time to drain down pipes, and fitters breaking joints, even after lengthy standing, should be warned to wear goggles, while working. It is a useful protection to place a strip of some flexible material, e.g. lead strip, round a flanged joint before breaking it. If there is any spurt of liquid, it will not splash into the worker's face.

Generally speaking, modern chemical plants are well lit, but wartime experiences of operating chemical works under black-out conditions leave no doubts of the value of adequate lighting. It is not unusual to ensure that gauges are well lit, but one does from time to time come across sampling cocks which are anything but, and it is at points like this where lighting should be generous. An electric torch can be used to look at a gauge, but two hands are usually needed to draw a sample.

Value of Alarm Systems. Where it is possible to put in an alarm system to give warning of a dangerous condition, it is obvious that this should be done. Where any such alarm system is electrically operated, it is equally important that there is a test circuit included in the warning system and that this test circuit is operated at frequent intervals. Just as it is considered good practice wherever possible to turn each valve on a plant once during every shift, if it is at all possible, so a test circuit should be operated during every shift. Apart from its value in ensuring that the warning device is working satisfactorily, it has the added psychological effect that if each plant charge-man, as he goes on duty, tests his warning devices he has then satisfied himself that they are in a state of readiness. The test should be recorded in the plant log.

Static Electricity. A hazard which has aroused much interest recently is that of static electricity. The reason is that it has provided a reasonable explanation for the cause of certain accidents, which otherwise could not easily be explained. Generation of static electricity by dry chemicals is no new phenomenon but the writer some time ago received details, which he was unable to confirm, of a fire caused inside a tank containing solvent, under the following circumstances: there

By John Green

The pseudonym 'John Green' masks the identity of the author, a leading authority on the safe handling of chemicals. Among the points he makes are:

- **Unusual swirling effects during stirring which caused vats to sway appreciably and led to an overspill.**
- **Serious damage can be caused in pipeline expansion as a result of abnormal changes in temperature.**
- **Pilot plant working should determine whether devices are necessary for the dispersal of static electricity.**
- **Some form of safety training should form part of the industrial education of all new entrants to the chemical industry.**

Safety in the Chemical Industry

was a fire adjacent to the tank and it was decided that it would be wise to flood the space above the level of the liquid with carbon dioxide from the fire-extinguishing system, which was done. As soon as the CO_2 started to discharge through a narrow bore pipe, there was an explosion. It was found on test afterwards that the CO_2 which had been stored in liquid form and, therefore, had been previously dried, could—under the particular circumstances under which it was sprayed into the space—produce quite heavy static charges. Devices are available for dispersing static electricity and also for detecting its presence. Here again, generosity should be the order of the day. It should also be possible during pilot plant working to decide whether such devices are likely to be necessary.

Fire Protection. It need hardly be said that adequate fire protection devices are needed and the scale and type should have been decided even before pilot plant working is started. The same thing may be said for the provision of breathing apparatus and the training of workers in its use. Indeed, the Chief Inspector of Factories, in his report for 1955, commented on the fact that in a number of chemical works the supply of such apparatus and the training of the workers in its use is not as good as it might be.

Safety Training

Coming back again to this training, it is desirable that all new entrants to chemical works, whatever their rank may be, should receive some training in safety and be told of the hazards of the process which they are either to operate or supervise. The number of times one meets new entrants into our industry whose safety knowledge is nil is surprising and some form of safety training, far more than the ordinary use of breathing apparatus, should form part of their industrial education. After all, it is part of the training of a fireman to use a self-contained breathing apparatus, so there is no reason why it should not be part of the training of a young process worker.

Storage Vessels. It may be opportune to say something about storage tanks. The pressures which may be developed in storage tanks in hot weather is surprising, particularly if the liquid being stored in them is a low boiling-point solvent. Therefore, there should be adequate venting and also in the case of low boiling-point solvents, storage tanks should be screened from the direct heat of the sun. It should be remembered when fitting a vent that the vapour which will come out may be explosive and is likely to be heavier than air. Thus it is advisable to watch that this vapour is not allowed to get near a naked flame. Indeed, although advocated the venting of storage vessels, it may perhaps be a safer procedure to regard storage vessels as pressure vessels and seal them acordingly. It would be unwise to dogmatise on such a point, as each case would have to be taken on its merits. It is just as difficult to give a clear-cut answer to a question of this sort, as it is to the answer as to whether a gas which is both inflammable and toxic should be passed through a pipe under pressure or vacuum. If a joint leaks in the former case, there is a toxic atmosphere created and, in the latter, there may be an explosion inside the pipe.

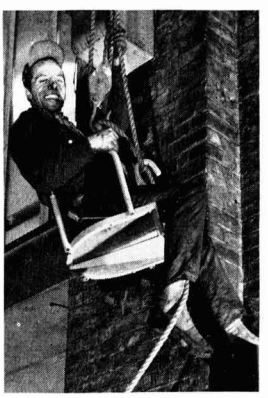
Batch Working.—On large modern installations, there are control panels and many other devices for ensuring the safe and efficient operation of them. In the case of the smaller batch plant, this is often far from the case. It is found that from time to time process men get into the habit of assuring that a plant is exactly the same as it was when they last inspected it. An example may make the point clearer. It was the custom on one plant with which the writer was concerned that the levers used for turning cocks were placed so that when the level was parallel to the pipe the cock was open and when it was at right angles to the pipe, the cock was closed. On one occasion an inexperienced process man altered the positions, fortunately without serious results. If such a set of circumstances have to be faced, it should be made as near foolproof as possible. In the case quoted, the answer was to fix the levers on the cocks. One could enlarge this point *ad nauseam,* but the example quoted will serve as a pointer.

Another aspect of batch plant working produces a very interesting human problem which might produce accidents. This concerns the conservative process worker who has no use for new-fangled gadgets. Some years before the war the writer was in charge of a nitration process. On one pot there was an old process worker who hardly ever had a batch 'go wrong.' The drive for the stirrer for his pot was an old single cylinder steam engine. The process worker concerned used to use a listening rod, such as is used by water works personnel to listen to the sound of the water in the pipes, to listen to the process going on and he controlled his heating, cooling and stirrer speeds by this and one thermometer. He could detect small changes in sound with amazing speed. There were temporary changes in viscosity during the process and it was clearly this that was his guide. An automatic controller to handle such a problem would have been extremely costly and complex and one often wonders whether the acquisition of such skills by newcomers to the industry ought to be encouraged or not. The writer had the chance of comparing his foreman's rule-of-thumb technique with his own laboratory tests on one occasion and found that his hands became as sensitive as his foreman's in about three months. Such techniques are cheap but not always certain.

'Chemical Age' Survey of New Safety Equipment and Apparatus

SPECIAL 'BOSUN'S CHAIR' FOR BUILDING WORK For construction and maintenance work on high buildings, chimneys, etc., the 'bosun's chair' produced by **W. C. Youngman Ltd.,** Manor Royal, Crawley, Sussex, is claimed to provide extra safety for personnel. It is a specially designed seat which is suspended from the structure by ropes and tackle and is intended to replace the generally accepted improvisation of a plank suspended by a rope from either end. A feature of Youngman's chair is a hook which comes up between the operator's legs around which the rope is securely tied. This, according to the makers, makes it impossible for him to fall out from either side, since the centre of balance is so arranged that it always tips against him and he can with safety lean forward either side.

The seat is made of ¾-in. resin bonded plywood with an angle iron frame while the chair frame is of mild steel tube. The sling and hook are of 1-in. diameter mild steel bar.



Youngman's bosun's chair

SAFETY DEVICES FOR DOORS OF VESSELS Improved versions of the Quicklock patent safety door for autoclaves and pressure vessels have been developed over a number of years and are now available from the manufacturers, the **Leeds and Bradford Boiler Co. Ltd.,** Stanningley, Pudsey, Yorks. Basically the design consists of a series of latches or triggers pivoted about the main bolts which hold the keep ring, which in turn withstands the load due to the internal pressure on the door plate. The bolts themselves are kept permanently tight. The trigger tails all pass through holes in an operating ring, a small movement of which is sufficient to lock or unlock the door.

The company's range of safety devices include the Surelock, which consists of a specially designed and very robust

spring loaded relief valve, so interlocked with the door mechanism that the valve can only be shut when the door mechanism is in the fully locked position, at all other times the valve is held wide open.

Complementary with the Surelock is the Mustlock, which consists of an inlet (or inlet and exhaust) valve interlocked with the door mechanism so that: (*a*) pressure cannot be admitted to the vessel until after the door is fully locked, and (*b*) the door cannot be moved from the fully locked position until the inlet has has been shut and the vessel vented to atmosphere via the third port of the valve (if a three-way valve has been used). The Mustlock is more positive at the beginning of the cycle, while the Surelock is more positive at the end of the cycle.

NU-SWIFT 5 LB. FIRE EXTINGUISHER

INTRODUCTION of a leakproof, strike-knob, 5 lb. carbon dioxide fire extinguisher, model 1505, is announced by **Nu-Swift Ltd.**, Elland, Yorks. The new model is complementary to the 10 lb. extinguisher,

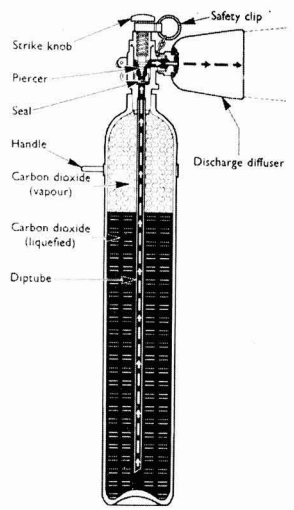


Diagram of 5 lb. CO_2 extinguisher

model 1510. Mainly intended for fighting inflammable liquid fires, and fires involving electrical equipment indoors, the new extinguisher has a mean range in still air of 11 ft., the carbon dioxide being expelled, for eight seconds at 65°F, through a novel type of discharge diffuser.

Designed for fire fighting at close quarters, the new model, in the hands of an inexperienced fire fighter, is capable of putting out an inflammable liquid fire covering from 6 sq. ft. to 9 sq. ft., depending on the experience of the fire fighter.

FLAME FAILURE EQUIPMENT

A RANGE of flame failure and lighting-up sequence controllers, designed specifically for use with the new high velocity air blast tunnel burners which have recently been developed by the Gas Council's Midland Research Station, will be of interest to those concerned with gas burning appliances and processes. The Elcontrol infra-red sensitive controllers (FST1 and FST2) provide correct programming for lighting up as well as flame failure shut-down, taking advantage of the special features of tunnel burners. Produced by **Elcontrol Ltd.**, Wilbury Way, Hitchin, Herts, they make use of the infra-red sensitive cell as in the FSM series; the FS2 gives fully automatic control with a completely programmed ignition cycle, while the FST1 is suitable for semi-automatic systems where initiating sequence is started manually.

ULTRA-VIOLET FLAME DETECTOR

FLAME detector with a high degree of discrimination is the Ultra-Vision, which senses only ultra-violet radiation and will not respond to simulated flame conditions. The Ultra-Vision can be used with all full and limited sequencing electronic relays. According to the suppliers, **Honeywell Controls Ltd.**, Ruislip Road, East Greenford, Middlesex, it can be used in the most difficult situations, and will even successfully control exothermic gas generators. It positively discriminates between flame and hot refractory and stops fuel delivery instantly on flame failure.

The Ultra-Vision detects the ultra-violet radiation that is present in all flames. It even detects electric sparks. Consequently it can be used to supervise gas fired, oil fired or combination (gas-oil) industrial burners, and if desired, electric ignition sparks.

MOUSE AS ATMOSPHERE MONITOR

Use of a mouse in a cage (bottom right in the above picture) to ensure that the atmosphere was safe to work in, during flaw and corrosion detecting operations carried out at I.C.I. Dyestuff Division's nylon works at Billingham, shows that even in these days of advanced monitoring and instrumentation, such comparatively primitive techniques still prove useful. In the photo, a field service engineer of the Industrial Division of Sperry Gyroscope Co. Ltd., Great West Road, Brentford, is carrying out an Introview flaw and corrosion survey inside one of the calandria evaporators at the Billingham nylon works. The Introview detector being used is marketed and manufactured by Sperry's under licence from I.C.I.

NORTHYLON FACE MASK

New anti-splash cap in Northylon p.v.c.-coated nylon, with protective apron front and cape. By Northide Ltd., 54a Tottenham Court Road, London W.1

LEAK DETECTION WITH RADIOISOTOPES

A METHOD for detecting leaks at a rate of less than one 60-millionth part of a cubic inch a day will be illustrated in the U.K. Atomic Energy Authority's exhibit at the 5th International Instruments and Measurements Exhibition in Stockholm in September.

Corresponding to a cube of about 1/400 in. side, a 60-millionth of a cubic inch appears to be a very small volume, yet it can contain 7,000,000 million atoms of the radioactive gas used in this particular application. Since, initially, some 16,000 of these atoms would decay and emit radiation each second, detection of their presence and calculation of the rate of leakage can be carried out with comparative ease.

To determine the rate at which leaks in sealed components would admit air or other gases, these are immersed in an atmosphere of radioactive krypton-85 gas which is raised to a known pressure for a fixed period of time. For outward leakage, the component is filled to the required pressure with a known specific activity of the gas. Sensitivity is reported to be about 100 times better than with a helium mass spectrometer.

Second of I.C.I.'s Three Safety Campaigns

Second of the three safety campaigns organised by I.C.I. has been in hand at the various divisions. Emphasis was placed on safe mechanical and manual handling and the use of hand tools. Works were supplied with posters illustrating hazards and safe working methods.

C.T.R.A. Fluid-bed Phthalic Process Now on Large-scale Industry Trials

SCOPE of the work done by industrial research associations in the Government scheme is given in a report, 'Research for Industry 1959', published by the Department of Scientific and Industrial Research and obtainable from H.M.S.O., price 8s. The report covers a wide range of research from bakery to wool and includes the reports of the research associations of man-made fibres, plastics, rubber and tar industries.

Changes have taken place in the chemistry department of the British Rayon Research Association where the work on the oxidation and the alkaline degradation of cellulose has been terminated or restricted to a very small scale. Part of the present activities is concerned with the modifying or improving of man-made fibres by chemical means, and a considerable part of the chemical research programme is now aimed at imparting 'minimum care' properties to continuous-filiament viscose fabrics. The technical research involved is being supported by a systematic assessment of the effect of controlled chemical modification of cellulose on its physical and mechanical properties. A study of the mechanism of the photochemical and thermal degradation of nylon 66 has been started.

Work at R.A.B.R.M.

For a number of years the Research Association of British Rubber Manufacturers has been doing work on polyvinyl chloride in addition to that on natural and synthetic rubber. Work in the U.S. has shown that if polythene is cross-linked by being heated with dicumyl peroxide after carbon black has been added, the tendency to crystallise and become brittle at room temperature is remarkably reduced. The implications of this discovery and the effect of possible non-black filters is being investigated.

In the field of vulcanisation, the association has developed in co-operation with an instrument manufacturing firm an instrument called a Shawbury-Wallace Curometer, with which the process can be followed while it is proceeding and the optimum cure time can be derived without the usual laborious procedure following the process. The association is pursuing the possibility of adapting the instrument for following the curing of thermosetting resins.

As the main textile reinforcement in car tyres is rayon the association is seeking to improve the adhesive bond between the rayon and the adjacent rubber layers.

One recent development in proofed fabric is the application of elastomer-coated nylon to replace the much heavier linseed-oil proofed tarpaulin.

Research into the composition of crude tars and their distillation residues is part of the work of the Coal Tar Research Association. It includes the complete assays of new types of tar, particularly tars from new oil gasification processes and the development of rapid method for characterising crude tars. Particular attention is being given to the recovery and purification of tar acids and the recovery and refining of naphthalene.

The preferential gasification of paraffins can be achieved in a fluidised coke bed at high temperatures and pressures. This type of process, and a new low-pressure oxidation-cracking process, are being studied as methods of upgrading such oils. The Association's fluidised process for phthalic anhydride production is undergoing large-scale pilot-plant trials in co-operation with a large firm to obtain design data for a commercial plant which the firm will erect.

Research Association of British Paint, Colour and Varnish Manufacturers is mainly concerned with the behaviour of the raw materials during processing and paint-making in both chemical and physical terms. Assessments have been made of the potentialities of various types of media, including those based on vinyl polymers and modified drying oils, for use in water-based form.

Chlorofluorocarbon Oils from Low-rank Coal

RESISTANCE to hydrolysis of chlorofluorocarbon oils obtained from low rank coals can be improved to a level equal to that of somewhat similar materials that are available commercially. This is stated in the 1959 annual report of the British Coal Utilisation Research Association published last week.

The improved resistance of chlorofluorocarbons is achieved by washing with strong aqueous sodium hydroxide and passing through a column of activated alumina. The specific resistance can also be raised to 5×10^{15} ohm-cm. by this treatment.

The report also deals with the gasification of low grade coal. The research into gasification is carried out under contract with the Ministry of Power, and has been concerned mainly with the gasification of powdered fuel injected into a fixed bed and with the study of slag behaviour. A marked improvement has been obtained in the overall efficiency of operation when fuel more finely ground than the usual pulverised fuel was used for gasification. Further data is required before an assessment can be made of the advantages of using a finer fuel. The results of tests in which smaller sized coke was used in the fuel bed showed that more dust is carried out of the gasifier with the gas than was the case with the large fuel used previously. This loss of dust has been reduced by using lower blast velocity.

Mixtures of coal and activated charcoal when heated in a slow stream of nitrogen to about 600°C gave rise to a colourless liquid, which was found to consist of simple organic compounds such as benzene and toluene. The yields obtained are substantially higher than those from the normal low-temperature carbonisation of the same coal. The gas evolved when carbonising coal/charcoal systems differ in composition from that evolved from coal alone and are greater in amount. The yield and composition of the products has been shown to be controlled largely by the amount of internal surface of the charcoal accessible to the volatile material emitted by the coal.

£7 Million Bonus for I.C.I. Employees

MORE THAN 93,000 I.C.I. employees have qualified for a 1959 bonus under the company's profit-sharing scheme. This bonus amounts to £7,306,000 gross (average per employee £78 7s. 4d.), which after deduction of personal income tax, is £5,523,000 (average per employee £59 4s. 10d.). This net bonus has been paid to the trustees of the scheme who will use it to acquire on behalf of employees £1,825,000 I.C.I. ordinary stock out of unissued capital.

Nearly a half of the stock handed over to employees last year has been retained by them.

Change of Venue for Polarographic Society

Owing to unforseen circumstances the venue of the informal meeting of the Polarographic Society to be held on 7 September has been changed to The Feathers, Tudor Street, London E.C.4. The meeting will start at 7 p.m. and there will be a talk by a representative of the Permutit Co. Ltd. on the use of ion-exchange water in polarography.

Pyrex £2 Million Expansion Programme

PRODUCTION of Pyrex glass for industrial and scientific purposes, as well as for electronics and housewares is to be raised 50% within the next few years under a £2 million expansion programme of James A. Jobling and Co. Ltd.

Most of the £2 million will be spent on acquiring a site in Sunderland near the present factory, and the building there of factory extensions and a new main warehouse. Other projects include extending and reorganising buildings and plant on the present 10-acre site, and a new depot and sales office for the South of England which is to be opened in September by Lord Brabazon. Provision is made within the programme for the development of the company's wholly-owned subsidiaries Quickfit and Quartz Ltd. and Q.V.F. Ltd.

It is expected that the expansion programme will have been completed by the end of 1964, although a substantial part of the money will have been spent by the end of next year. New buildings and plant are needed primarily because of an expanding business. Last year was the company's most successful.

Overseas News

LARGE-SCALE CHEMICAL EXPANSION PROJECTS BY MITSUBISHI

A CONSIDERABLE expansion is announced for the petrochemical centre which has grown up at Yokkaichi, some 60 miles south-west of Nagoya, in Japan. Mitsubishi Petrochemical Co. Ltd. plan the erection of a second benzole plant there and the expansion of the existing unit at a cost of Yen15,000 million ($41.7 million) for the production of aromatic hydrocarbons.

The associated concern Mitsubishi Chemical Industry Co. Ltd. are to erect a second acrylic acid plant there next year, while Nippon Gosei Gomu K.K. will extend their existing 35,000-tons-a-year synthetic rubber plant by a further 60,000 annual tons. Also on the Yokkaichi site, the Ajinmoto Co. are to build a works for the monthly output of 300 tons of sodium glutamine, this capacity to be later extended to 1,200 tons a month.

The Kobunshi Kagaku will within the next three years take up production of synthetic resins and vinyl acetate, while within the same period the Edogawa Kagaku concern are to start production of hydrogen peroxide.

o-Xylene Capacity to be Raised by Humble Oil

Humble Oil are to raise their capacity for the production of *o*-xylene at Baytown, Tex, from 44 to 72 million lb./year, with an extensions due to be operational by the end of 1960. The company says it could raise this to 165 million lb./year without much delay. The new *o*-xylene plant of Delhi-Taylor at Corpus Christi, Tex, is now on stream with an annual capacity of 70 million lb./year. Total U.S. capacity is now put at 181 million lb./year, to be increased by next year to 404 million lb./year, with new plants planned for Cities Service and Sinclair Chemical.

Cyanamid Italia to Produce Pharmaceuticals for C.M.

The American Cyanamid Co. have set up in Catania, Sicily, Cyanamid Italia. The company is to produce initially pharmaceuticals and will supply Common Market and Mediterranean countries. Cyanamid Italia will also be the "centre of Cyanamid development in Italy".

1 Million Tonnes of Carbide from E. German Plant in 1961

By next year the East German chemical plant V.E.B. Chemische Werke Buna will, it is stated, become the biggest carbide producer in the world by raising its production to nearly 1 million tonnes a year. Last year the Buna plant produced more than 600,000 tonnes, of calcium carbide. By 1965 total East German carbide output will be running at about 1.2 million tonnes a year, most of this to come from the expanded Buna plant, only the first of whose three new carbide furnaces will have been brought into operation by next year.

Dow Propose Polythene Plant in Japan

A proposal has been placed before the Japanese government by Asahi-Dow Ltd., an associated company of the Dow Chemical Co., U.S., for the construction of a polythene plant at Kawasaki, Japan.

According to the proposal, the new plant would use the high pressure polythene process developed by AG. für Olefinpolymerisation (AGFO process). The principal licensor of the process, Scientific Design Co. Inc., New York, concluded recently a contract authorising Dow's Swiss subsidiary, Dow Chemie AG., to use the process for high pressure polythene in several countries on a non-exclusive basis for the benefit of its manufacturing subsidiaries and associated companies. In the case of Japan, however, Scientific Design agreed that the license be granted exclusively to Asahi-Dow.

Since the proposal also includes the use of Dow know-how in the fields of polythene manufacture and fabrication, Asahi-Dow have been able to present a fully integrated proposal to the Japanese government.

Asahi-Dow also manufacture styrene, polystyrene and Saran plastics materials at plants in Kawasaki, Nobeoka and Suzuka City, using Dow know-how and technology.

Carbon Black to be Produced at Hamilton, Ontario

Columbian Carbon (Canada) Ltd. are to build a $5 million plant on a site purchased from the city of Hamilton, Ontario. Construction will start at once, with a production goal of August 1961.

Reichhold Beckacite to Build S.D. Maleic Unit in France

A 400 tonnes/month, or 10.5 million lb./year, maleic anhydride plant is to be built by Reichhold Beckacite, France, an affiliate of Reichhold Chemicals, Inc., at Niort, Deux-Sevres, France. Scientific Design will design the plant and grant a licence for the use of the S.D. maleic anhydride process and the special catalyst required. Engineering services, as well as complete equipment and construction of the plant will be furnished by Soc. Française des Services Techniques S.a.r.l., Paris, a member of the S.D. Group.

Reichhold Beckacite are the second French company to acquire an S.D. maleic anhydride licence, and will be one of Europe's major producers of this chemical. Compagnie Française des Matieres Colorantes (Francolor), were the first to acquire the complete design and process for a maleic anhydride plant from S.D. This company has recently enlarged maleic capacity at its Villers-St. Paul plant.

Only One Czech Chemical Target Will be Met in 1960

According to newspaper *Pravda*, published in Prague, only one construction target in the whole Czech chemical industry will be met this year. It is for the oil refinery and oil processing plant being built near Bratislava.

Sweden Plans Fertilisers From Dephosphorisation Liquor

The Swedish metals producers A/B Grängesberg-Oxelösund will bring on stream this autumn an experimental plant to produce fertilisers from waste liquors from their dephosphorisation unit at Gängesberg. These liquors are said to contain both nitrogen and phosphorous.

Rumanian Acetylene-from-methane Claim

Rumanian scientists claim to have invented a new process for the industrial production of acetylene from methane gas by catalytic cracking. By-products arising from the process include indene, cyclopentadiene and a polymer compound resistant to heats up to 400°C and with excellent acid and solvent resistance.

A.B.C.D.'s Ragusa Polythene Plant to Make 12,000 Tons

The new plant which the A.B.C.D. Co. have built at Ragusa, Sicily, at a cost of Lire 14,000 million, will process about 250,000 tonnes of crude oil a year which will be supplied by Gulf Italia from their nearby oilfield. Some 12,000 tonnes of polythene will be produced yearly. Most of the equipment for the new plant has been obtained from West Germany.

Du Pont Plan Further Nylon Capacity Increase

A $9 million programme to modernise and expand their nylon plant at Seaford, Del, is planned by E.I. du Pont de Nemours. Although Du Pont do not disclose the new capacity, they state that most of it will be in 501 carpet nylon. The company already has a project in hand to expand nylon tyre cord capacity at Richmond, Va, from 40 million lb./year to 100 million lb.

Caustic-chlorine Facilities On Stream in Rumania

The Borzesti chemical combine in Rumania has recently opened units for the production of DDT and monochlorobenzole and is about to bring on stream plants for chlorine liquefaction, caustic

soda evaporation and rock salt electrolysis. Before the end of this year a unit will be opened at Borzesti for the electrolytic production of 450,000 tonnes of caustic soda annually. The Onesti combine, also in Rumania, is engaged in building a phenol unit to add to its existing petrochemical facilities, while the Forgaras plant has just brought into production a 100,000-tonnes-a-year ammonium nitrate works, the largest of its kind in Rumania.

Better Mechanical Properties for New Solid Propellant Binder

A new binder for solid rocket propellants is claimed by the Rocketdyne Division of North American Aviation to be leading to larger rocket motors. A carboxy-terminated linear polybutadiene, the new binder is said to have better mechanical properties than polybutadiene-acrylic acid copolymers. The binder has a generally symmetrical structure, resulting from stereospecific polymerisation. Hydrocarbon chains lie parallel to each other and cross-linking is perpendicular to the chains.

This new material helps overcome one of the major technical difficulties of large solid propellant motors, the withdrawing of the mandrel after the propellant is cast.

Esso Interest in Swedish Petrochemical Plans ?

A Swedish concern, together with a foreign oil concern—said by Stockholm newspapers to be Esso—is planning to spend some Kr.300 million on the building of a petrochemical complex at Stenungsund, about 25 miles north of Gothenburg (see also CHEMICAL AGE, 6 August, p. 203). Negotiations with the local authorities for the purchase of a site for 6 million crowns are said to be in progress. Stenungsund is an ice-free oil port which can take tankers of up to 65,000 tons. Further details are expected to be given later.

$2.8 Million Expansion For Celene's Sicilian Plant

The Import-Export Bank has approved a loan of $2.8 million to Instituto Mobiliare Italiano. This credit will be used to expand capacity and the range of products of the plant which Celene are operating at Melilli, Syracuse.

Originally designed to produce polythene, this plant will shortly also produce propylene glycol, diethyl ether, propanolamine, and propylene oxide. Equipment will be supplied by Union Carbide International, New York.

Cyanamid-Ketjen Platinum Reforming Catalysts

The commercial production of three new types of platinum reforming catalysts has been started by Cyanamid-Ketjen of Amsterdam. The catalysts, named CK-303, CK-306 and CK307, have been developed by the research department of one of Cyanamid-Ketjen's parent companies, the Dutch Royal Sulphuric Acid Works. The catalysts are said to be an improvement on the platinum reforming catalysts already produced by Cyanamid-Ketjen. They can be used in any type of platinum reforming unit under high as well as low pressure operating conditions, giving improved yield of high octane gasoline, and are fully regenerable.

First Japanese Detergent Alkylate Plant

The first Japanese detergent polymer and alkylate plant is to be built at Kawasaki, near Tokyo by Nippon Petroleum Detergent Co. Ltd., a new company owned 55% by Nippon Petrochemicals Ltd. (a Nippon Oil subsidiary) and 45% by Oronite Chemical. Patent licenses and know-how for production of Oronite's Alkane '60' alkylate detergent will be supplied by Oronite. Nippon Petrochemical will supply propylene for the polymer from their adjacent plant. The new unit should be completed late next year.

New Site for I.C.I.A.N.Z. Pigments Plant

A 330-acre site has been chosen for the £A1.5 million pigments plant of Imperial Chemical Industries of Australia and New Zealand at Werribee, near Melbourne. The site originally chosen at Altona was closer to the city but had to be abandoned due to drainage problems.

Further Phthalic Expansion for Allied Chemicals

Frankford, Philadelphia, plant of Allied Chemical is to be expanded to a capacity estimated at 100 million lb./year from the present level of 75 million lb./year. Completion is scheduled for early next year. The company also has plans to build a phthalic anhydride plant at Los Angeles, with an estimated capacity of 25 million lb./year.

'Halvic' to Double Output of P.V.C.

'Halvic'-Kunststoffwerke G.m.b.H., Hallein, Austria, have started an expansion scheme which will increase their p.v.c. capacity from the present level of 7,500 to 8,000 annual tonnes to a new level of 15,000 tonnes. Interested in 'Halvic,' who started production in 1953, are the Belgian Solvay concern (as major shareholder), I.C.I. and the Austrian banking body Creditanstalt.

Coal Tar Chemicals Plant For Czechoslovakia

Work on the erection of a plant for coal tar chemicals is to begin at Valsaske Mezirici, in the Moravian region of Czechoslovakia, next year. A plant for the processing of crude benzole will be brought into use in 1963 and the complete plant two years later.

Sun Oil Plan 100 million lb. Naphthalene-from-petrol Unit

A projected $8 million naphthalene plant at Toledo, Ohio, for Sun Oil is to be built by M. W. Kellogg. With a capacity of 100 million lb. a year this will be the world's largest petroleum-based naphthalene plant.

Stauffer Chlorine Production for American Chemical

Output of the chlorine plant that Stauffer Chemical are to build near Los Angeles is scheduled for use by American Chemical Corporation, who are jointly owned by Stauffer and Richfield Oil Co. It will be used for the production of vinyl chloride, ethylene chloride and ethylene dichloride. The plant should be completed by late next year.

W. Europe Dyestuffs Production Rose 21% Last Year, Says O.E.E.C. Report

THREE study groups of the Organisation for European Economic Co-operation, those for dyestuffs, petrochemicals and plastics, all of which are part of the O.E.E.C. Commission for Chemical Products, met recently to discuss developments in production.

Dyestuffs. Last year, West European dyestuff output reached the record figure of 128,000 tonnes, or 21% higher than the 1958 level. Trade in these products, particularly on an inter-European level, rose at an even greater rate than that of production. Demand on both home and export markets within the area will continue as high as during 1960, and production will be as high as last year's levels, if not exceeding them.

Petrochemicals. Expansion of the West European petrochemical industry continues. Over last year O.E.E.C. member countries invested some $270 million in this industry, compared with a total of $226 million in 1958. Investments of about $800 million are anticipated for the three-year period 1960-1962. As a result of this expansion, a sharp increase in European petrochemical exports will probably be needed to keep the industry working to full capacity.

Plastics. Something over 2 million tonnes of plastics were sold by O.E.E.C. member countries last year, representing an increase of 24% over 1958 sales. As a comparison, U.S. sales of plastics rose over the same period by 21% to a total of about 2,300,000 tonnes. As in former years, the greatest increase was in the field of thermo-plastics. Here, sales rose by 32%, as against a sales increase of 1958 over 1957 of only 19%. Considerable investments were made last year in the erection of new manufacturing plant for thermoplastics. Consumption per head of population of plastics was last year higher in Federal Germany than in the U.S. at a figure of 12.2 kg. (U.S. 11.1 kg.). Plastics-per-capita consumption in other O.E.E.C. countries included 1959 figures of 9.8 kg. in Sweden, 8.4 kg. in Denmark and 7.5 kg. in the U.K.

PEOPLE in the news

● **Dr. J. C. Hudson, D.Sc., D.I.C., A.R.C.S.,** who has been in charge of the British Iron and Steel Research Association's research on corrosion since the formation of B.I.S.R.A. in 1945—will retire at the end of August. He will, however, continue to have close ties with the association, since he has agreed to act as consultant to both the corrosion advice bureau and the chemistry department.

● **Dr. L. M. Jackman, M.Sc., Ph.D. (Adelaide),** lecturer at the Imperial College, has been appointed a London University reader in organic chemistry at the college.

● **Dr. Fred Wrigley, M.R.C.S., L.R.C.P., D.I.H., M.P.S.,** at present sales director of the Wellcome Foundation Ltd., Euston Road, London N.W.1, will from 1 September succeed **Mr. Leslie G. Matthews, M.M., F.P.S.,** as director in charge of the associated companies of the group overseas, who is retiring at his own wish. Mr. Matthews has had a long association with the Wellcome Foundation, which he joined after qualifying with distinction as a pharmaceutical chemist in 1921. From 1942-44 he acted as secretary of the general penicillin committee set up by the Ministry of Supply. At the end of the war Dr. Wrigley joined Roche Products as director of clinical research and after seven years went to Canada as medical director for CIBA for three years, before being appointed manager of the Pharmaceutical Division and assistant general manager of the whole of the CIBA activities in Canada. On his return from Canada he became general sales manager (medical) with the Wellcome Foundation, and was appointed general sales manager in January 1957, and was elected to the board as sales director in September 1957. He is also a director of Cooper, McDougall and Robertson Ltd.

● **Mr. R. H. Prince, M.A.,** demonstrator in organic and inorganic chemistry at Cambridge, has been elected a fellow of St. John's College.

● **Mr. H. G. Lazell,** chairman of the Beecham Group Ltd., has been elected president of the National Advertising Benevolent Society for 1960-61.

● **Mr. F. F. Parkinson** has been appointed a director of William Blythe and Co. Ltd., Holland Bank Works, Church, near Accrington.

● **Sir Robert Robinson, O.M., F.R.S.,** a director of the Shell Chemical Co. Ltd., one of two Nobel Laureates to take part in the symposium on 'The chemistry of natural products' that is being held in Australia this month, will at the end of the meeting summarise all the papers presented.

● **Mr. Paul D. Scott** and **Mr. John L. Smart,** who have been appointed vice-presidents of Dow Chemical of Canada Ltd., have both been with the company for 18 years. In 1957, Mr. Scott became assistant general manager, broadening his responsibilities to encompass all phases of the expanding operations of Dow Chemical of Canada, including manufacturing. Mr. Smart was appointed assistant works manager in 1951 and development manager in 1956.

● **Mr. R. G. Berchem,** managing director, succeeds the late Mr. T. Blundell Brown as chairman of Jeyes' Sanitary Compounds Co. Ltd. **Mr. J. V. Richardson,** who has been a director since 1949, has been appointed deputy chairman.

● **Mr. J. S. Stanners, B.Sc.,** has succeeded Dr. J. C. Hudson, who has retired as head of corrosion research in the chemistry department of the British Iron and Steel Research Association. **Mr. E. E. White, F.R.I.C., A.M.I.M.M., F.Z.S.,** has been appointed head of the B.I.S.R.A. corrosion advice bureau.

● **Mr. Osgood V. Tracy,** formerly president of Esso Standard, division of Humble Oil and Refining Co., affiliated to Standard Oil (New Jersey), has been elected a director and an executive vice-president of W. R. Grace and Co., New York. He will be in charge of the chemical business of Grace and will be responsible for the seven operating divisions as well as the Research Division comprising the Grace Chemical Group.

● **Mr. A. E. Canavan, B.Sc., A.R.I.C.,** is the first student to gain a Ph.D. in chemistry at Leicester University. He obtained his B.Sc. at Liverpool University.

● **Mr. M. Thwaite** has been appointed manager of Croda GmbH, the newly formed subsidiary in Dusseldorf of the Croda Organisation Ltd., Cowick Hall, Snaith, Goole, Yorks.

Obituary

Mr. Arthur J. Caddick, former manager of the Middlesbrough chemical firm of Sadler and Co., has died at the age of 74. He started his career with Acklam Ironworks and the North-Eastern Steel Co. He was coke-oven and by-products manager for the South Durham Steel and Iron Co. Ltd., and after the war appointed general manager of Sadler and Co., being responsible for coke-ovens, tar distillation, and acid works plant. He retired some years ago.

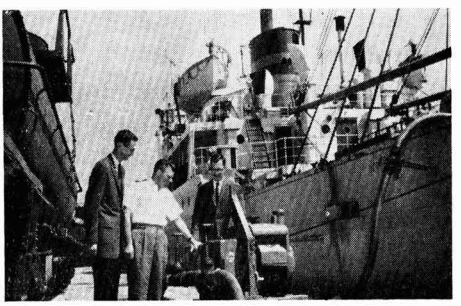
New Administration Block for Ashburton Chemical

The new laboratory and administrations buildings of Ashburton Chemical Works, Trafford Park, Manchester, are to be opened by Mr. Reginald Maudling, president, Board of Trade, on 14 October. Ashburton Chemical are one of the U.K. manufacturing companies of the Geigy group. The new buildings are of great architectural merit and have been specially designed for their various purposes.

100,000 Gall. of Synthetic Latex Shipped to U.K. Foam Rubber Producers via St Lawrence

A CARGO of 100,000 gall. of synthetic rubber latex for use in foam rubber—the largest cargo ever shipped from a Great Lakes port via the St. Lawrence Seaway—has been shipped from Cleveland, Ohio, to Swansea aboard the *Manchester Pioneer*. Produced at the Akron O synthetic rubber plant of the Goodyear Tire and Rubber Co., the latex was transported to the Cleveland riverfront in 10 railroad tank cars. The latex was pumped into four deep tanks on the ship.

Introduced last year, the latex—Pliolite 5352—is used as a replacement for natural rubber latex in foam rubber. Consistent quality, dependable supply and lower cost are the major advantages claimed for the new synthetic over natural rubber.



Pumping the synthetic rubber latex aboard the 'Manchester Pioneer' at Cleveland, Ohio

Company Meeting

THE DISTILLERS COMPANY LIMITED

THE 83rd Annual General Meeting of The Distillers Company Limited will be held in the North British Hotel, Edinburgh, on Friday the 9th day of September, 1960, at 12.15 p.m. The following are excerpts from the Statement by the Chairman, Sir Graham Hayman, which has been circulated with the Report and Accounts for the year ended 31st March 1960.

GENERAL OBSERVATIONS ON TRADING

Once again I am able to report that the results for the year constitute a new record in earnings, and the total value of the Group's turnover exceeded £233,000,000, representing an increase of 11% over the previous year. Although nearly all branches of the Company have contributed to this result, by far the major proportion is attributable to increased sales of Scotch Whisky. The Industrial Group has also had a satisfactory year with 27% increase in earnings, and the return on capital employed compares favourably with its leading competitors.

Turning to the Accounts, the trading profit of the Group amounts to £30,419,758, compared with £24,989,991 last year, and income from trade investments totalled £2,373,590 against £1,788,997, so that our total income was £6,014,360 higher than last year, at £32,793,348.

Interest on loan stocks has been reduced by a further repayment of £1,000,000 and now requires £649,509, and the profit attributable to outside shareholders in Subsidiary Companies is somewhat larger at £533,715, so that the profit of the Group after all charges amounts to £31,610,124, compared with £25,693,778 last year. Taxation this year requires £14,743,700, leaving a net profit of £16,866,424—almost £3,700,000 more than last year.

There is a substantial credit below the line in respect of taxation reserves no longer required and, of the total available for appropriation, £5,698,134 has been retained by Subsidiary Companies, leaving £12,542,720 to be dealt with in the Accounts of the Parent Company.

With due regard to the future capital requirements of the Company, and to the higher rate of profits tax which will be payable next year, your Board feels able to increase the dividend by 2½% and recommends a final dividend of 10% which, with the interim of 5% already paid, makes 15% for the year. The Board has also transferred £5,000,000 to general reserve, and it is now proposed, subject to the approval of the shareholders, to capitalise part of the reserves by the issue of one new ordinary share of 10s. credited as fully paid for every five ordinary shares held.

SCOTCH WHISKY

Our Malt and Grain distilleries, despite the drought last year, have completed their distilling programme with improved efficiency and productivity.

New warehouse construction has continued throughout the year to accommodate our rising stocks. As far as possible, our new warehouses are sited in rural areas and each is equipped with the most modern fire detection systems to ensure immediate action by fire fighting services in the event of an emergency. Since the war, approximately £250,000 has been expended by the Company on fire detection installations.

I reported last year on our decision to abandon the quota system in the Home market, to enable our brands to come into free supply. I am glad to say that our experience during the year has clearly demonstrated the high regard of the public for our brands.

The total Industry sales of Scotch Whisky in that market—in spite of derationing—are still below the level achieved immediately prior to the War, and it is clearly important to secure an expansion in the Home trade. This will not be an easy task, and some reduction in the present punitive rates of duty would provide a valuable stimulus.

With regard to the Export markets, the U.S.A., which still absorbs approximately one half of the Industry's exports, continues to take increasing supplies. Most leading brands are now fairly freely available, and while some further expansion in sales can be expected to follow the growing prosperity and increasing population, there is no doubt that greater efforts will be required by both shippers and importers to secure this.

In other markets where shipments are not affected by local restrictions, the demand for our brands during the past year has, in many cases, been greater than we could satisfy. Certain additional gallonage will be available during the current year, and while it is too early to say if this will be readily absorbed, the fact that our brands are strongly established in all important export markets gives good grounds for confidence in the outcome.

GIN

In my last statement, I referred to the increasing competition which our Gin Companies were facing in the Home Market. These conditions have continued, but I am able to report that our brands have more than held their position, and sales showed a very satisfactory increase over the previous year.

Our general export trade was satisfactory, and total shipments show a substantial increase.

Your Company has under consideration the production of one or more of its brands of Gin in various overseas markets where changing economic conditions and competition from local manufacture make this desirable.

INDUSTRIAL GROUP

CHEMICAL DIVISION. With the general revival in industrial activity, there has been a substantial increase in the sales of all our chemicals, with a corresponding improvement in earnings. While no new major plants were brought into production, our butanol manufacture was fully re-established at Hull, and the new plant for continuous manufacture of phthalate plasticisers is in full operation. Carbon dioxide had a record year, and the industrial use of this product continues to increase.

A major development, recently announced in the Press, is the construction of a new plant to produce acetic acid. This plant will operate an entirely new process developed by our Research Department, which should give significant economies in production costs.

BRITISH HYDROCARBON CHEMICALS LIMITED. Three new plants have been commissioned during the year. The first plant, for the production of high density polyethylene, presented a number of teething problems. These are now being steadily overcome, and production of specification material is now fully established. The two other units for the production of cumene and phenol are both operating well and to full capacity.

Three further major projects are now in hand. First, a substantial increase in our production of butadiene, for which there is an increasing demand in the manufacture of synthetic rubbers. Second, a new plant to produce methanol, which has a wide variety of industrial uses. The third project is the production of ethylene dichloride, which will be used by our Plastics Division in their expanding manufacture of polyvinyl chloride resins.

The new cracking plant, with its capacity of 70,000 tons per annum of ethylene, to which I referred last year, was successfully commissioned in June of this year.

Forth Chemicals Limited, and Grange Chemicals Limited, subsidiaries of British Hydrocarbon Chemicals Limited, have each had a very good year. Forth

Company Meeting—cont'd

Chemicals Limited has decided on a further increase of its production of monomeric styrene, which should be in operation by the end of the year.

PLASTICS DIVISION. Last year's indications of an increased demand for plastics, particularly for industrial applications, have been fully confirmed, and this Division has had an exceptionally busy year.

British Geon Limited has in hand a further substantial increase in its capacity for polyvinyl chloride, for which the demand is still increasing. It is also increasing its production of Hycar oil resistant synthetic rubbers.

British Resin Products Limited has had a good year, a particular feature of which has been the promotion of the sales of 'Rigidex', the new polyethylene made by British Hydrocarbon Chemicals Limited. This material is finding increasing acceptance in a number of new fields.

Distrene Limited increased its production of polystyrene during the year, to meet expanding sales.

BIOCHEMICAL DIVISION. Although this Division succeeded in increasing its volume of sales, and there was continued improvement in technical efficiencies, the low prices ruling in world markets have resulted in substantially reduced margins. Special efforts are being directed to the discovery of new products to broaden our base in this business, and some progress is being made.

SOUTH AFRICA. Contrary to the general trend in South Africa, our associate company, National Chemical Products Limited, succeeded in achieving a record year in turnover and profits.

TECHNICAL DEVELOPMENT

The Company takes considerable pride in the fact that our technologists have built up a first-class reputation both in this country and with the many overseas companies with whom they have regular contact, and the Board has every confidence in their ability to break new and fertile ground in the future.

PERSONNEL

It is appropriate to record a sincere tribute and the grateful thanks of the Board to all employees both at home and overseas, for the part they have played in the service of the Group.

Open Days at Winfrith Atomic Establishment

ON 16 and 17 September the Atomic Energy Establishment, Winfrith, will be open to invited guests from private and nationalised industry, Government departments and laboratories, universities and research associations and the area surrounding the Establishment. On 16 September, Lord Chandos will be the principal guest; he will be welcomed by Sir William Penney, A.E.A. member for scientific research. On these days all the major laboratories and plant at Winfrith will be shown to visitors, including those of the O.E.E.C. Dragon project.

TRADE NOTES

Control Board Components

The engineering group of the General Electric Co. Ltd., Erith, Kent, has recently revised its technical description No. 403 which deals with control board components. The new edition includes more details of the terminal sizes used on various components.

Approved Breathing Apparatus

The Siebe, Gorman Mark IV self-contained compressed air breathing apparatus, which has now been approved under the Chemical Works Regulations 1922, is an open circuit unit using ordinary air compressed at 132 atm. The apparatus operates on a two-stage pressure reducing system. The first stage reduces the pressure from that existing in the cylinder to 60 lb. p.s.i., and air at this pressure is delivered to the second stage valve. The latter is held shut by a spring-actuated lever which in turn is moved by a flexible rubber diaphragm when the wearer inhales. The cylinder of the apparatus contains approximately 1,200 litres when charged to 132 atmospheres.

Furfuryl Alcohol Resins

Service Bulletin No. 1008 on Durez furfuryl alcohol resins is available from Omni (London) Ltd., 35 Dover Street, London, W.1. The leaflet covers the nature, curing and use of furfuryl alcohol resins with particular reference to their most successful applications in corrosion-resistant mortar cements. The cements prepared are used to join chemical resistant tile and acid-proof brick. The resins are also used in a chemical-resistant floor covering mix made from a catalysed furfuryl alcohol resin and a washed silica aggregate free from alkaline materials.

Dyestuffs from France

Several new dyestuffs have been introduced by Compagnie Francaise des Matieres Colorantes, Paris, and are being marketed in the U.K. by the sole concessionnaires, Alliance Dye and Chemical Co. Ltd., Grecian Mill, Lever Street, Bolton, Lancs. Acetazol Black JBZ is an azo dye for the dyeing of acetate cakes; Neutrogene Black J increases the range of Naphtazol-Fast base combinations developed by neutral steaming; while a new vat dyestuff for all printing methods is Solanthrene Printing Brown 3R paste fine. Solanthrene Olive Green F-2J Neopowder, Solane Blue BJ, and Chrome Fast Red JRL are the other new products.

Metal Cleaning Service

Metal Cleaning Ltd. is the new name given to the recently acquired subsidiary of the Castrol Group. The previous title of De-Corrosion Services (Norwest) Ltd. has been discontinued. The company provide services to clean corroded metals and remove all other forms of metal contamination. The techniques used include electro-chemical and chemical immersion, and flame and shot blasting. Once the essential task of cleaning is completed, appropriate protective treatments are applied. The processes are carried out either on site or at the company's Liverpool works, 2-6 St. John's Road, Bootle, Liverpool 20.

Antioxidant for Pyrolysis Gasoline

Developed as an antioxidant for converting certain highly unstable liquid hydrocarbon fractions into stable and marketable gasoline, Topanol AN is a mixture of phenolic compounds which is a liquid at atmospheric temperature and pressure and is readily soluble in hydrocarbon oils and distillates. The unstable hydrocarbon fractions for which it is especially suited are those produced in high-temperature cracking processes in the petroleum chemical industry. Notes on properties, applications and handling are given in a booklet from I.C.I. Heavy Organic Chemicals Division, Billingham, Co. Durham.

Lignin-resin Laminate

Benelex 70, an industrial laminate manufactured by the Masonite Corporation of Chicago, is now being made available in the U.K. from Mosses and Mitchell Ltd., 60 Ironmonger Row, London E.C.1, who are also able to fabricate it, where required. Benelex is a dense, lignin-resin hardboard claimed to have high structural strength, dielectric strength, dimensional stability and other properties, including resistance to many chemicals. Uses are stated to include chemical vats and laboratory work-tops.

Paper Impregnation Resins

Omni (London) Ltd., 31 Dover Street, London W.1, U.K. distributors for Durez resins, have released a leaflet containing technical information on four Durez resins for paper impregnation. Durez 398 is for the impregnation of filter papers used as oil and air filters in cars. When cured the resin will withstand the small quantities of sulphuric acid that might be in the oil. Durez 11897 is supplied for the impregnation of paper tubes. Durez 12335, a one-step phenolic thermosetting resin which is satisfactory for addition to a beater, is used for pulp preform moulding, and Durez 14139 is recommended for electrical grade impregnated tubes.

Supplement to B.S. for Pesticide Names

DEMAND for common names for organic pest control chemicals has increased steadily with the availability of new products and a second issue of the supplement to B.S. 1331 'Recommended common names for pesticides' has now been issued. Copies are available from the British Standards Institution, Sales Branch, 2 Park Street, London W.1, price 2s (postage extra to non-subscribers).

Besides listing all recommended common names, the supplement gives their systematic chemical names and formulæ and other relavent information. It is hoped that further names will be published before the end of this year.

Commercial News

- D.C.L. Plan One-for-five Share Issue
- H. & W. and Laporte Issues well Subscribed
- Higher Half-year Profits for C.I.L.
- Hoechst Acquire Lloyd of Cincinnati

Distillers Company

In his annual statement, Sir Graham Hayman, chairman of the Distillers Company Ltd., said the board had transferred £5 million to general reserve and that it was now planned to capitalise part of the reserves by the issue of one new 10s ordinary share credited as fully paid for every five ordinary held. It was intended to declare an interim dividend of 6% (5%) on the present capital; that payment should not be taken as an indication that the total dividend next year would be any higher than the equivalent of the current year's dividends. (See also p. 280.)

Hickson and Welch

In the issue of 500,000 ordinary shares of 10s each at 40s per share of Hickson and Welch (Holdings) Ltd., shareholders have exercised their rights to subscribe to the extent of 496,371 shares, or 99¼% of the shares provisionally allotted to them. Shares not taken up have been sold and the net proceeds, after deduction of the issue price, will be remitted to the persons to whom the provisional allotment letters were issued.

Lacrinoid

Share exchange offer for the £176,000 capital of Lacrinoid Products, plastics manufacturers, has been made by F. Francis and Sons (Holdings). The offer, consisting of two Francis 5s shares for every nine Lacrinoid 2s units or alternatively 4s 4½d cash per Lacrinoid share, is open until 12 September or not later than 30 September.

Laporte Industries

Of the 2,627,280 10s ordinary shares offered to Laporte Industries shareholders at 2s each 98½% have been accepted by approximately 60% of the shareholders.

Canadian Chemical

Net sales of Canadian Chemical Co., Ltd., and subsidiaries for the six months ended 30 June, amounted to $14,294,498, an increase of 13% over the corresponding 1959 period. The increase partly reflects materials purchased for sale pending completion of the 40% expansion of the petrochemical facilities now under way. Net profit for the half year was $1,490,462.

Canadian Industries Ltd.

Canadian Industries Ltd. and subsidiaries in the first six months of 1960 had increases of 16% in consolidated sales and 27% in consolidated net income. Sales for the period totalled $91.15 million ($78.7 million). Net income amounted to $4,492,000 or 51 cents a common share ($3,537,000 or 40 cents).

Exports of Terylene and of polythene were much higher than in the first half of 1959, although competition in world markets for polythene was severe and increasing. Domestic sales of Terylene also showed an encouraging increase. Acid sales for the processing of uranium were lower than a year ago, and future shipments are likely to be reduced.

Construction of C.I.L.'s caustic potash plant at Cornwall, Ont., and the new polythene film extrusion and converting plant of the company's subsidiary, Mastex Industries, at Brampton, Ont., are well under way. Both plants are scheduled for completion this year.

Du Pont of Canada

Sales for the first half of 1960 were 12% higher than in the corresponding period of last year, report Du Pont of Canada. The physical volume of shipments was 20% greater as gains were made by all manufactured products and export business improved. Earnings amounted to $3,680,000, equal to 50 cents a share ($3,665,000 or 49 cents). Net sales rose to $49,805,000 ($44,523,000).

Drug Houses of Australia

Drug Houses of Australia are holding further discussions on the possibility of forming a joint company with Cyanamid International, subsidiary of the American Cyanamid Co. Drug Houses already have a link with Cyanamid through their subsidiary, Lederle Laboratories.

Two recent Australian mergers in the pharmaceutical field include the acquisition by Johnson and Johnson of a controlling interest in Andrews Laboratories Pty., to provide an organisation for the distribution of McNeil Pharmaceuticals. The second merger was between Mead Johnson, of Indiana, and Charles McDonald Pty., of Sydney.

Farbwerke Hoechst

Farbwerke Hoechst have announced the purchase of Lloyd Brothers Inc., of Cincinnati, Ohio. The acquisition was made through Hoechst's U.S. subsidiary, Intercontinental Chemical Corporation, of New York. Lloyd Brothers, one of the oldest U.S. manufacturers of medicinal goods, will continue their own programme of production and at the same time will represent Hoechst interests on the U.S. pharmaceutical market.

International Nickel

Interim report of the International Nickel Co. of Canada, and subsidiaries for the half of 1960, shows net earnings of U.S. $43,902,000, equivalent to $1.50 per common share ($38,391,000, or $1.31 per common share on lower capital).

Deliveries of nickel in all forms during the second quarter were less than the record high deliveries made in the first quarter.

Reichhold Chemicals

Reichhold Chemicals Inc., U.S., recorded a net profit of $1,740,000 ($1,750,000) and sales of $49,770,000 ($47,410,000) for the first half of the current year. Net profit per share was 47 cents (55 cents).

Market Reports

SPOT OFFERS OF PHTHALIC ARE SCARCE

LONDON Conditions on the industrial chemicals market have shown little change on the week. The movement on home account has been reasonably good for the period and rather more enquiry has been reported for nearby delivery dates.

Prices generally are steady, but copper sulphate is lower by £2 10s/ton, being currently quoted at £30 10s/ton, less 2% f.o.b. Liverpool.

Supplies in the main are easy enough but spot offers of phthalic anhydride and oxalic acid are scarce. Most of the coal tar products are firm against a steady demand.

MANCHESTER The undertone of prices on the Manchester market during the past week has been steady and few changes of any consequence have occurred. There is a fair contract movement of the bread-and-butter lines to the textile and allied trades and most other industrial outlets, and shipping business keeps up at about its recent satisfactory level. Fresh bookings have been on quietly steady lines allowing for continued holiday influences. The tar products are mostly moving well and a fair demand for compounds and for basic slag is reported in the fertiliser section.

SCOTLAND On the whole, business has again been quiet in most sections of the Scottish heavy chemical market, although in the Glasgow area some improvement has been apparent. It is hoped, however, in the forthcoming week, with the completion of most of the main holiday periods, that a resumption of normal trading conditions will be apparent.

There has been little change in regard to agricultural chemicals, with a continuance of seasonal quietness. Prices generally have been firm with little change. The export market continues brisk.

NEW PATENTS

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 21 September

Preparation of explosive substances. Taylor, G. W. C., and Napier, S. E. **849 101**

Purification of tri-N-butyl phosphate. United Kingdom Atomic Energy Authority. **848 791**

Acyl-anilides and their manufacture. Howards of Ilford Ltd. **848 663**

Preparation of tetrahalomethanes. Haszeldine, R. N., and Iserson, H. **848 561**

Manufacture of cellular polymeric materials. Imperial Chemical Industries Ltd. **848 910**

Block polymers of α,-olefins and process for preparing same. Montecatini Soc. Generale Per l'Industria Mineraria E Chimica. [Addition to 810 023.] **849 106**

Fuel elements for nuclear reactors. Parsons & Co. Ltd., C. A. **849 216**

Fluorocarbon-radical-containing organic compounds. Minnesota Mining & Manufacturing Co. **849 641**

Production of sulphuric acid. Buss AG. **849 107**

Method of preparing esters. Goodrich Co., B. F. **849 109**

Regeneration of solvents used in the preparation of isocyanates. Francais Etat. **848 986**

Method and apparatus for fluoride removal from gases. Wheelabrator Corp. **848 708**

Manufacture of polymeric materials. Imperial Chemical Industries Ltd. **848 671**

Silicone water repellents. General Electric Co. **849 111**

Recovery of lipids. Kaufmann, H. P. **848 689**

Acrylonitrile polymer filamentary materials and process for treating same. Chemstrand Corp. **848 696**

Complex solutions of copper 8-hydroxy quinolate and their process of preparation. Compagnie Francaise Des Matieres Colorantes. **849 274**

Water-soluble complexes of 8-hydroxy-quinoline and a process for their preparation. Compagne Francaise Des Matieres Colorantes. **849 275**

Production of branched unsaturated ketones. Badische Anilin- & Soda-Fabrik AG. **848 931**

Inorganic papers and method of making same. General Aniline & Film Corp. **848 936**

Alkaline earth metal silicates and method for their treatment. Columbia-Southern Chemical Corp. **848 933**

Process for the polymerisation of lower olefins. Farbwerke Hoechst AG Vorm. Meister, Lucius, & Brüning. **849 112**

Methods of producing gels. Philips' Gloeilampenfabrieken N.V. **849 113**

Manufacture of alkyltitanium halides. Farbwerke Hoechst AG Vorm. Meister, Lucius, & Brüning. **848 887**

Process for the manufacture of polyolefins. Farbwerke Hoechst AG Vorm. Meister, Lucius, & Brüning. **848 888**

Nitrogen-containing polymers. Du Pont De Nemours & Co., E. I. **849 154**

Halogen-free silica pigments, cured products containing same, and method of preparation thereof. Goodrich Co., B. F. **848 673, 848 765**

Silicon dioxide pigments and preparation of same. Goodrich Co., B. F. **848 674**

Manufacture of steroids. Lepetit S.p.A. **848 914**

Polymeric compositions. Monsanto Chemical Co. **849 181**

Segmented polymers. Rohm & Hass Co. **848 915**

Electrical high frequency interference suppressors for ignition systems. Bosch GmbH, R. **849 268, 848 753**

Reinforced rubbery copolymeric compositions. Phillips Petroleum Co. **848 754**

Organic compounds of tin and a process for their manufacture. Farbwerke Hoechst AG Vorm. Meister, Lucius, & Brüning. **849 220**

Monoacrylate and mono-(methyl substituted acrylate) esters and polymers thereof. Goodrich Co., B. F. **848 919**

Process for the manufacture of carboxylic acid aryl esters. Ciba Ltd. **849 166**

Anthraquinone-triazine monoazo dyestuffs and their manufacture and use. Ciba Ltd. **849 115**

Treatment of aqueous solutions of complex metallic cyanides. National Research Development Corp. **848 555**

Cyclic olefins. Studiengesellschaft Kohle. **848 951**

Dithiocarbamate derivatives. Rohm & Hass Co. **849 116, 848 894**

Production of phosphorylamides Monsanto Chemical Co. **848 952**

Method for utilising waste heat from exothermic chemical reactions. Michalicka, L., Drasky, J., and Mayer, M. **848 895**

Polymeric cellular products. Koppers Co. Inc. **849 117**

Resinous compositions. British Industrial Plastics Ltd. **848 678**

Method of producing amino acids. Kyowa Hakko Kogyo Kabushiki Kaisha. **849 279**

Method of producing 1-glutamic acid. Kyowo Hakko Kogyo Kabushiki Kaisha. **849 280**

De-acidifying of ammonia water. Bergwerksverband GmbH. **848 834**

4-Substituted steroid compounds and the preparation thereof. Soc. Farmaceuta Italia. **849 098**

Process for the production of polycarbonates. Distillers Co. Ltd. **849 081**

Reserpine derivatives and process for their manufacture. Ciba Ltd. **849 082**

Production of synthetic elastomers. Imperial Chemical Industries Ltd. **848 837**

Epoxide resins. Devoe & Raynolds Co. Inc. **848 960**

Manufacture of foamed polymeric materials. Imperial Chemical Industries Ltd. **848 672**

Polymerisable compositions. Imperial Chemical Industries Ltd. **848 816**

Treatment of polymers. Imperial Chemical Industries Ltd. **849 085**

Method for manufacture of aluminium fluoride. International Minerals & Chemical Corp. **849 010**

Production of synthetic elastomers. Imperial Chemical Industries Ltd. [Addition to 848 837.] **848 980**

Production of aryloxybutyric acids. Monsanto Chemicals Ltd. **849 089**

Pharmaceutical compositions comprising 1,2,3,6-tetrahydropyridines. May & Baker Ltd. **849 282**

Method for removing solid contaminant and/or emulsified water from organic solvents and oils and apparatus for practising said method. Bowser Inc. **848 817**

Purification of cyclohexane. Esso Research & Engineering Co. **848 820**

Polymerisation of olefins. Eastman Kodak Co. **848 983**

Method and apparatus for purification of solvent used in the polymerisation of olefins. Phillips Petroleum Co. **849 232**

Method and apparatus for recovery of solid polymer from vaporised solvent. Phillips Petroleum Co. **849 120**

Production of heat resistant bodies of molybdenum disilicide. Kanthal A.B. **848 985**

Polymerisation of olefins. Petrochemicals Ltd. **849 256**

Polymeric substances. Du Pont De Nemours & Co., E. I. **849 090**

Process for the stabilising of esters of phosphorus containing acids. Geigy AG, J. R. **848 485**

Production of perchloryl fluoride. Pennsalt Chemicals Corp. **848 486**

Polyamide production. Monsanto Canada Ltd. **849 000**

Methods of bonding saturated aliphatic hydrocarbon polymers to other materials and articles so produced. Western Electric Co. Inc. **849 021**

Permeable polymeric coatings and films. Du Pont De Nemours & Co., E. I. **849 155**

Isonicotinylhydrazide derivative and process for its preparation. May & Baker Ltd. **848 502**

Blow moulding of polytetrafluoroethylene. Resistoflex Corp.. **849 025**

Cyclic olefins. Studiengesellschaft Kohle. [Addition to 848 951.] **849 236**

Ion-exchange resins and their manufacture. Permutit Co. Ltd. **849 122**

Polymers of ethylene. Cabot Inc., G. L. **849 027**

Ethylene polymerisation. Imperial Chemical Industries Ltd. [Addition to 806 649.] **849 028**

Manufacture of copolymeric products. Courtaulds Ltd. **849 029**

Method of forming resilient foams from polyvinyl chloride and polyvinyl-chloride-polyvinyl ester copolymer plastisols. Chemetron Corp. **848 825**

Polypropylene-butyl rubber blends. Esso Research & Engineering Co. **849 023**

Anion-exchange process for uranium. United Kingdom Atomic Energy Authority. **848 764**

Aqueous compositions having diminished corrosive properties. Imperial Chemical Industries Ltd. **849 126**

Apparatus for the measurement of the hydrazine content in a solution. Cambridge Instrument Co. Ltd. **848 525**

Preparation of vat dyestuffs of the naphthoylene diarylimidazol series. General Aniline & Film Corp. **848 768**

Oxidation of organic compounds. Imperial Chemical Industries Ltd. **849 041**

Production of aliphatic nitriles from olefins. Distillers Co. Ltd. **848 924**

Nitrocyclododecanes and cyclododecanone oxime. Studiengesellschaft Kohle. **849 237**

Process for removing carbon dioxide from gas containing same. Chemical Construction Corp. **848 528**

Polyolefins. General Electric Co. **849 042**

Metallisable monoazo dyestuffs of the benzeneazo-naphthalene series. Compagnie Francaise Des Matieres Colorantes. **849 043**

Method for the preparation of pure propylene. Bergwerksgesellschaft Hibernia AG. **848 927**

Cyclododecadiene monoepoxide, and its production from cyclododecatri-(1,5,9)-enes. Studiengesellschaft Kohle. **849 238**

Process for removal of metallic catalyst residues from hydrocarbon polymers. Du Pont De Nemours & Co., E. I. **849 044**

Sulphur dyestuffs of the phthalocyanine series. Cassella Farbwerke Mainkur AG. [Addition to 816 656.] **848 880**

Preparation of polyurethane plastics. Farbenfabriken Bayer AG. **848 965**

Process for the production of diacyl hyponitrites. Imperial Chemical Industries Ltd. **848 492**

Production of hydrochlorides of basic carbamic acid esters. Badische Anilin- & Soda-Fabrik AG. **848 737**

Polyester compositions. Howards of Ilford Ltd. **848 826**

Polymerisation of unsaturated organic compounds. Imperial Chemical Industries Ltd. **849 048**

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