Chemical Age

PREVIEW OF OCCA EXHIBITION
(page 423)

VOL. 77 No. 1965

9 March 1957

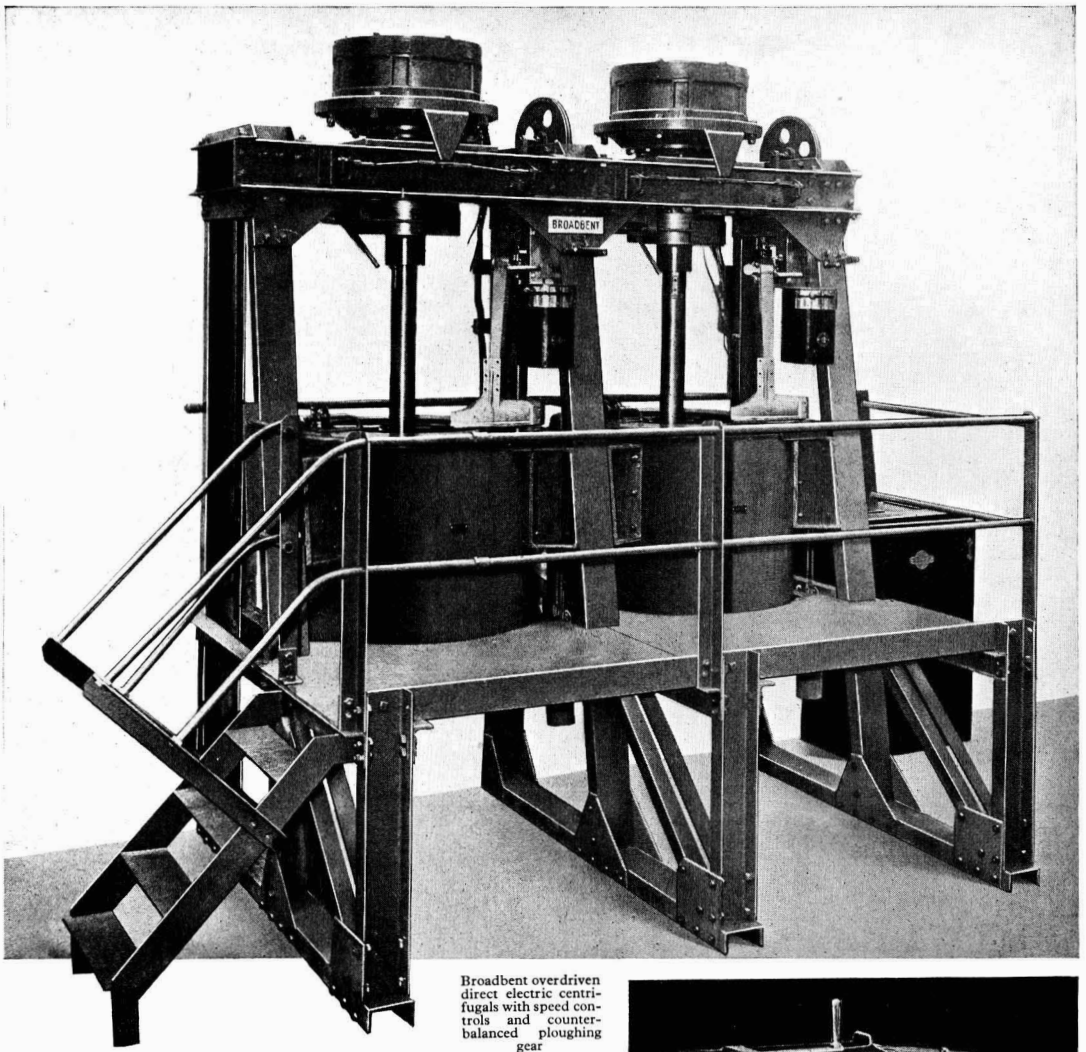
INDEX TO ADVERTISERS

The first figures refer to advertisement in **Chemical Age Year Book**, *the second to the current issue*

[*continued on page 396*

INDEX TO ADVERTISERS

The first figures refer to advertisement in **Chemical Age Year Book**, *the second to the current issue*

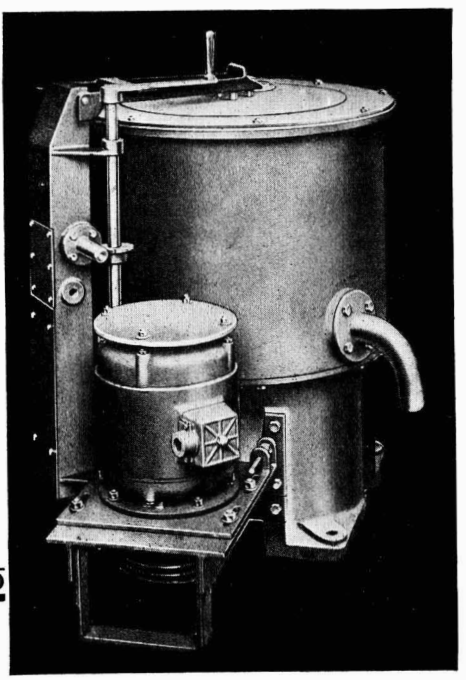


Broadbent overdriven direct electric centrifugals with speed controls and counterbalanced ploughing gear

CENTRIFUGAL SEPARATION

Broadbents specialise in the effective application of centrifugal force wherever separating, filtering or clarifying is required.

High speed centrifugals with rapid acceleration ensure drier solids and clearer liquors with shorter cycles and increased profits.

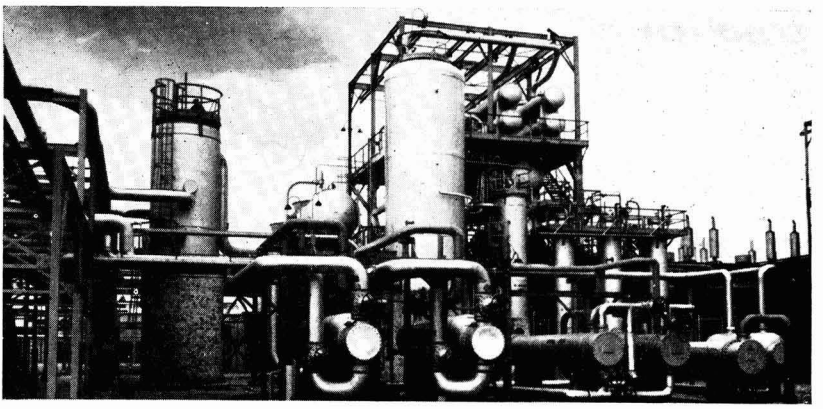


Broadbent 21" type 86 centrifugal with an interchangeable basket and outercasing

Consult the centrifugal specialists—

THOMAS BROADBENT & SONS LTD

CENTRAL IRONWORKS HUDDERSFIELD
Phone 5520/5 Grams 'BROADBENT' Huddersfield

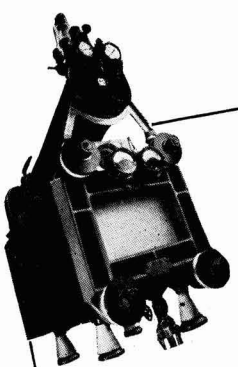


A HIGHLY EFFICIENT SELF CONTAINED CHEMICAL ENGINEERING SERVICE.

We provide a chemical engineering service which can be tailored to satisfy all or any part of a complete process scheme.

From a wealth of experience the Chemical Engineering Division will design and provide a complete installation based upon our own or clients' developments. Show us your flow diagram, we will design pilot or full scale plant and procure all equipment, install it, and commission the whole project.

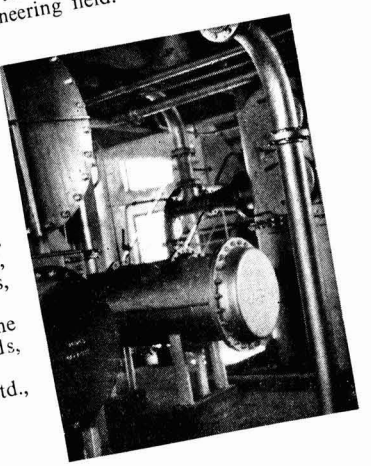
If you have a chemical process development in mind, qualified C-J.B. chemical engineers are immediately available for initial discussion.



Now incorporated within the C-J.B. organisation Bamag (1953) Ltd., brings world wide experience and considerable technical assets to widen the Company's horizons in the Chemical Engineering field.

BAMAG (1953) LIMITED

PROPRIETORS: COSTAIN-JOHN BROWN LIMITED



Bamag (1953) Ltd., studies particularly the problems and designs economical plant for vegetable and fish oil extraction, fat splitting, deodorising, bleaching, refining glycerine processing and hardening, production of technical oils for the paint and varnish industries, polymerisation etc.
On the inorganic side it designs and supplies plant for the production and concentration of sulphuric and nitric acids, denitration of spent acids etc.
For the production of hydrogen and oxygen Bamag (1953) Ltd., supply their well known and proved electrolysers.

COSTAIN-JOHN BROWN LIMITED

(CHEMICAL ENGINEERING DIVISION)

ROXBY PLACE · FULHAM · LONDON S.W.6

Telephone : FULham 7761

IA832

... with M&B brand Chemical Intermediates

HERE IS A SELECTION FROM OUR WIDE RANGE

ALLYLAMINE · ALLYL BROMIDE · 3-AMINO-4-HYDROXYPHENYLARSONIC ACID · 2-AMINOPYRIDINE · *iso*-AMYL BROMIDE · *p*-ARSANILIC ACID · *n*-BUTYL BROMIDE · DECYL BROMIDE · DIETHYL MALONATE AND SUBSTITUTED MALONIC ESTERS · DIMETHYL ETHER · DIMETHYL SULPHATE · ETHYL BROMIDE · ETHYL CYANACETATE · ETHYL IODIDE · ETHYL ORTHOFORMATE · HYDRIODIC ACID · HYDROBROMIC ACID · HYDROQUINONE AND DERIVATIVES · METHANE SULPHONYL CHLORIDE · METHYL BORATE SOLUTION · METHYL BROMIDE · METHYL GLUCAMINE · METHYL IODIDE · 3-NITRO-4-HYDROXYPHENYLARSONIC ACID · SODAMIDE

MANUFACTURED BY

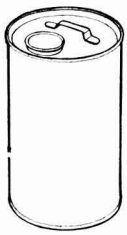
MAY & BAKER LTD

DAGENHAM · ENGLAND

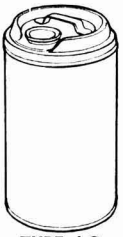
ILFord 3060 · Ext. 319

Further information will gladly be supplied on request.

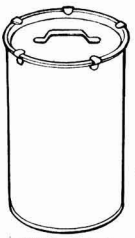
ASSOCIATED HOUSES: BOMBAY • LAGOS • MONTREAL • PORT ELIZABETH • SYDNEY • WELLINGTON • BRANCHES AND AGENTS THROUGHOUT THE WORLD



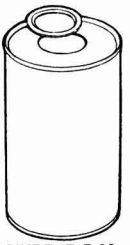
TYPE D.L.A.
For Oils and Paints.



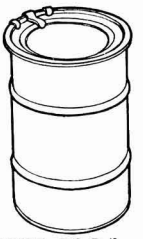
TYPE I.C.
Easy pouring for Paints and Oils.



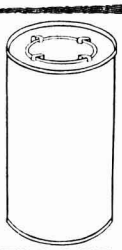
TYPE K.P.A.
For Pastes, Semi-Liquids and Powders.



TYPE D.P.X.
For Chemicals, Powders, etc.

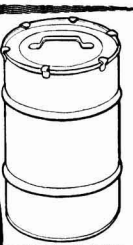


TYPE D.L.R./L.
Removable Lid—secured by closing band.

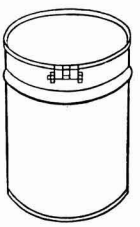


TYPE D.U.T.
For Greases, Powders and Pastes.

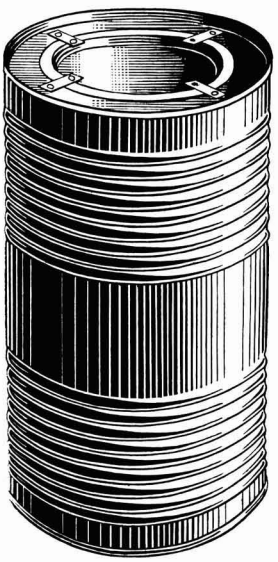
TODD drums can take it!



TYPE K.P.X.
For Pastes, Powders, etc.



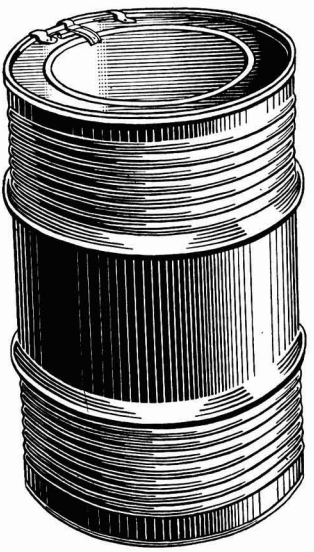
TYPE L.W.R./M.
Light-weight. Lid held on by closing band.



WHATEVER your product, there's a Todd drum to take it. A drum built to take punishment—to preserve the condition of your product from factory to user. Todd drums protect your reputation.

◀ **TYPE D.P.K.**
Another of Todd's drums which are specifically designed for Chemicals. Various sizes of lids available.

TYPE D.L.R./L. ▶
The drum for your product if you require a fully removable lid with quick acting hoop closure—easy to fill—easy to empty.



TODD
DRUMS AND KEGS

Send for complete list of drums and kegs to:

TODD BROS. (ST. HELENS AND WIDNES) LTD., WIDNES, LANCS. Telephone: WIDNES 2267 (2 lines)

D

CARBINERT *(IMPERVIOUS GRAPHITE)* FOR THE CHEMICAL AND PROCESS ENGINEER

The Cascade Cooler is constructed entirely from CARBINERT standard components, and is being adopted on an increasing scale throughout the Chemical and Process Industries for cooling corrosive liquids and gases. It has proved particularly useful for cooling hydrochloric acid and wet or dry chlorine. The unique properties of CARBINERT bring to the chemical engineer a material whose widening scope of application offers vast potentialities.

Our Engineers will be pleased to discuss the application of CARBINERT to your particular need.

THE **MORGAN CRUCIBLE** COMPANY LIMITED

Enquiries to : NORTHFIELDS · WANDSWORTH PARK · LONDON S.W.18 *VANdyke 2366*

CH/116A

VOL. 77 No. 1965
9 MARCH 1957

Telephone : **FLEet Street 3212** *(26 lines)*
Telegrams : **Allangas . Fleet . London**

Editor M. C. HYDE
Manager H. A. WILLMOTT

Director N. B. LIVINGSTONE WALLACE

Midlands Office
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

Leeds Office
Martins Bank Chambers, Park Row Leeds 1. [*Leeds* 22601]

Scottish Office
116 Hope Street, Glasgow, C.2. *Central* 3954-5]

IN THIS ISSUE

Annual subscription is 52s 6d ($7.40), single copies 1s 3d (by post 1s 6d).

CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

EURATOM AND THE UK

LAST WEEK reference was made in page 386 to the visit of Euratom's 'three wise men' to Britain. At a conference at the end of their brief tour of nuclear power plants and companies involved in all aspects of nuclear plant construction, it was learned that the UK has offered to aid Euratom in its nuclear power development programme. This programme involves the construction of nuclear power plants with a total generating capacity of 15,000 megawatts (15 million kilowatts) to be installed within the next 10 years.

The UK offer not only includes the supply of nuclear power stations and their fuel, but also the sending of a 'task force' of nuclear energy experts to give further advice at meetings to be held in Europe shortly. A similar offer had been made to Euratom by the US last month.

Undoubtedly this visit of Euratom's 'wise men' to the UK is of vital importance, for this country stands to gain contracts worth hundreds of millions of pounds. The only other supplier in the nuclear power field is, of course, the US, and the one big customer for both is the continental countries joined together in Euratom.

These countries are anxious to speed up atomic power developments, for besides the political and economic aspects of power production in Europe there is the notable failure of coal production in keeping pace with industrial growth. Indeed, some 35 million tons of coal had to be imported from the US last year. Also there is the question of oil.

Last year the six Euratom countries imported the equivalent in energy of some 100 million tons of coal (22 per cent of the countries' total energy needs). By 1965, it is estimated, some 200 million tons of coal would have to be imported, or 35 per cent of these countries' needs and by 1975 the figures will have risen by about 300 million tons, or over 40 per cent of the total energy needs. Similarly the bill for fuel will probably triple itself in the next 20 years.

By means of the common exploitation of atomic energy, through Euratom, the six Euratom countries hope to stabilise their energy imports by early 1960's, that is, long before each could hope to do so on their own with development of atomic power.

Britain's advantageous selling point over that of the US is that our problems regarding atomic power development are similar to Euratom's. The US has great fuel stocks at a cheap price, and while it has much know-how in atomic energy, it has not the same incentives to apply it. In this country, there is a nuclear power station already operating on a commercial basis—a fact which was stressed by the Euratom observers. As Professor Giordani, one of Euratoms 'wise men', noted, anyone wishing to build a nuclear power station must soon realise the special importance of the UK success in designing and building industrial size atomic power stations using so much conventional engineering technique and equipment. This is particularly important in the case of Europe, where there is a shortage of trained nuclear engineers.

Supplies of enriched uranium fuel were a notable feature of the US offer. This type of nuclear fuel is not available in this country in sufficient

quantities or at a reasonably low price. However, the UK consider that this fuel is not of marked importance in view of improvements in efficiency which have been made at the Calder Hall station, where ordinary uranium fuel is used. This may also be regarded as a forceful selling point since it would mean that Euratom countries would not be dependent on a highly processed fuel imported from a dollar source of supply.

Until recently the UK has remained aloof from Euratom. As in the case of the common market, the UK has tended to favour a wide, loose form of co-operation. It is now obvious, however, that if Britain refused to collaborate with the Euratom project in some form, then the UK's chances of exporting nuclear power stations or other nuclear energy equipment to Euratom countries would undoubtedly be affected.

It is gathered that Euratom have decided to go ahead with both UK and US types of power stations, although in view of Euratom's aims for power, its programme will tend to be influenced by British experience. Therefore, the closest possible collaboration with Euratom is advocated for Britain, so that this country can benefit from European research when this is undertaken.

PAINT RESEARCH STATION

FOUNDED in 1926 with an annual income of £10,000, the Paint Research Station has grown till at the present time its annual income is £70,000. Originally the Department of Scientific and Industrial Research provided 50 per cent of the income, the remainder coming from industry. DSIR's contribution has risen less in proportion and is now 31 per cent.

Work carried out at the Paint Research Station covers every aspect of paint, from raw materials to the finished product ready to be applied to the surface. Individual companies pay a sum in proportion to their staff. Where the company is not devoted entirely to paint manufacture, as is the case with ICI for example, the sum payable is negotiated.

In 1954 the annual turnover of the paint, pigment, varnish and lacquer industries was estimated at between £70 million and £80 million. Presumably it has grown since then. £70,000 seems a very small investment, bearing in mind the importance of paint to all aspects of industry and commerce. If individual companies are not willing to take the lead and increase payments then the Government, through DSIR, should show the way. Surely in this corrosion-conscious age no-one needs reminding of the importance of paint and other protective coatings.

RESEARCH EXPENDITURE

ACCORDING to the February issue of the *Treasury Bulletin for Industry*, it is reported that Britain, compared with the US, spends a higher proportion of its gross national product on research and development—2 per cent, against 1½ per cent.

However, in Britain, nearly two-thirds of research expenditure is devoted to defence compared with rather less than a half in the US. Research per head of population in the US appears to be about double that in the UK.

Preliminary figures for 1955 suggest that some £325 million was spent on research and technical development in this country, private industry providing £185 million, but of which nearly £120 million came from the Government. Of this total, three-quarters of it was spent by the aircraft, electrical engineering, and chemicals and allied industries. This information was given in a paper by Mr. Rudd of the DSIR read at the British Association meeting last September.

In the first of a new series of reports 'Reviews of data on research and development', prepared by the US National Science Foundation, research expenditure by the US Government, industry, universities and 'other institutions' during 1953 (the year chosen by NSF) is analysed.

Results obtained indicate that almost $5.4 billion was spent in the US for research and development in 1953. Of this the Government provided $2.8 billion and industry $2.4 billion. The two remaining groups provided $180 million. The Federal Government was, therefore, the main source of research funds. However, it only spent $970 million or 35 per cent in its own laboratories, which accounts for 18 per cent of all US research. The rest of the money went to research done for the Government by industry ($1.5 billion), or schools and research centres ($330 million).

On the other hand, US industry kept most of its research funds—some $2.3 billion of its total $2.4 billion. Thus, when the $1.5 billion from the Government is added, it is found that industry handled 72 per cent of all US research in 1953. One per cent of industry research money went to schools.

Universities carried out $460 million worth of research in 1953, which is 9 per cent of the total US figure. Schools financed 30 per cent, or $130 million, of this amount and the Government paid for $280 million, or 61 per cent of the total.

NATURAL GAS SHIPMENTS

IN the House of Commons on 4 March, the Paymaster-General was asked about the possibilities of liquefied natural gas shipments to the UK.

Replying, the Paymaster-General stated that technical progress in this matter had reached a stage at which the Gas Council was considering the matter. He added, 'I believe that this is a thing we may look to for quite considerable benefits in the future.'

It is understood from the Gas Council that this project is very long term for the following reasons: In order to transport the natural gas, it must be liquefied. This can be effected by deep-freezing the gas down to about minus 260°F. However, the liquefied gas must be kept at the deep-freeze temperature during transportation. According to a Gas Council spokesman, at atmospheric pressure the gas is concentrated to about one sixth-hundredth of its original volume, which enables large quantities to be transported in a comparatively small space. However, in engineering circles it is considered that transport of the liquefied gas at atmospheric pressures is unlikely.

There are no suitable vessels at the present time for carrying natural gas under the conditions which have been devised by US research. Conversion of existing vessels to transport liquefied natural gas would present great difficulties. However, it is doubted if conversion would be possible at all, for a steel has been found which will withstand the attack of the liquefied gas. Construction of special tankers is likely to take several years, while the cost of such tankers would be at least double that of ordinary tankers, if not more.

It has not been possible to discover whether the gas will be highly purified before being liquefied. Impurities in liquid gas such as sulphur and hydrogen sulphide would certainly give rise to difficulties. At the low temperatures required for liquefaction of the gas any hydrogen sulphide present would solidify. There is also the problem of emptying the tankers on arrival in the UK, particularly by means of pumps.

As the project is within the realms of possibility, technical investigations into the above mentioned problems are being carried out on behalf of the Gas Council by the North Thames Gas Board. But it must be noted that unless the fuel situation in this country became very serious indeed, the cost factor alone relegates shipments of natural gas to the basis of an interesting research project.

AMMONIA FROM OIL PLANT NEARS COMPLETION AT BILLINGHAM

NEW oil gasification plant now nearing completion at the Billingham Division of ICI Ltd. will, when in stream, be the first in the UK to produce ammonia from oil. The new plant, which will cost several millions, will not displace the present method of gas production for ammonia.

The decision to proceed with an oil gasification plant, in preference to expanding the existing process based on coal, was taken two years' ago largely on the grounds of costing. There are five distinct plants: (1) a tonnage oxygen plant to provide oxygen and nitrogen from the air; (2) oil gasification, to convert oil into a mixture of roughly equal parts of hydrogen and carbon monoxide gases; (3) a carbon monoxide conversion plant where carbon monoxide is reacted with steam to give carbon dioxide and hydrogen; (4) carbon dioxide removal, which uses a different process from the present plant; (5) Gastechnik plant to purify the carbon dioxide and recover sulphur from it.

The new process produces gases under pressure, eliminating some of the extensive compression operations in the ammonia process. Broadly the oil gasification technique is as follows: Liquefication of air is accomplished in the oxygen plant with separation into its components, nitrogen and oxygen, by fractional distillation. Some of the nitrogen is compressed to 260 atmospheres and is used in the synthesis plant to make ammonia; some of the remainder is used for 'instrument air' to operate the plant instruments; what is left is available for other uses at Billingham.

Fractionating

Liquefying and 'fractionating' or separating into its components of 50 tons of air an hour is possible with this plant. The oxygen is used in the oil gasification. The gasification plant produces hydrogen. Heavy fuel oil is injected into a special furnace with steam and a limited amount of oxygen. Gasification takes place at a high temperature and as the furnace is inside a pressure vessel, the crude gas, when it leaves this plant, is already under pressure produced in the reaction.

Crude gas goes to the carbon monoxide conversion plant, where the carbon monoxide is reacted with steam to give carbon dioxide and more hydrogen, as in the existing hydrogen plant, except that the reaction takes place under pressure.

In the next stage, carbon dioxide is removed by means of a new process developed in the US and made available in this country by the Power Gas Corporation as licencees. Hot potassium carbonate is used for washing out. Afterwards, the hot potassium carbonate is regenerated and used again. Following this stage, the hydrogen goes through a final purification stage and is then compressed to a pressure of 260 atmospheres and passed to the synthesis plant.

Before discharge to the atmosphere, the carbon dioxide is passed over pelleted iron oxide in a Gastechnik plant in which sulphur is recovered and cast into blocks for conversion into sulphuric acid.

A similar oil gasification unit using the same kind of oil is to start operations at Millhaven, Ontario, by Canadian Industries Ltd. Mr. A. A. Deans and Dr. W. D. Matthews, two of the Billingham plant managers are now in Canada assisting with the start-up. The Division technical department has had overall responsibility for design of the new unit at Billingham and it has been assisted by the Power Gas Corporation as main contractors and by other contractors for certain specialised sections of the plant.

The new plant, including offices, plant and pipes have been painted in different colours as part of a scheme which will break away from the traditional conception of black or dull colours for chemical plants. Pipes carrying gases and services will have their own code of bright colours.

New Polythene Plant For Shell Chemical

A FURTHER STEP forward in their development of Ziegler polythene is announced by the Shell Chemical Ltd., 15-17 Great Marlborough Street, London W1. In the early summer a new plant will come into production at Partington with an annual capacity of 1,000 tons.

Shell Chemical have appointed Erinoid Ltd., Stroud, as an agent to handle part of their sales of Zeigler polythene in the UK, particularly in the injection moulding field.

Appeal for Paisley College

Paisley Technical College has launched an appeal for £200,000 towards the cost of a £500,000 extension project. The appeal is particularly directed to the industries that will benefit from the development of the college. If successful the appeal will give the college a £300,000 share of the £10 million that has been earmarked for technical and technological education in Scotland.

Monsanto Bring New Cyclohexylamine Plant on Stream at Newport

A NEW PLANT at the Newport factory of Monsanto Chemicals Ltd. for the manufacture of cyclohexylamine (hexahydroaniline) has come on stream and is now in full production. Part of the output will be used by Monsanto in the manufacture of rubber accelerators, but an appreciable volume will be marketed as a chemical intermediate used in the production of paints, petrol, lubricating and cutting oils, resins and wax-emulsion polishes and textile processing.

Molecular weight of the new chemical, which meets the requirements of BS 2534/1955, is 99.2. Its physical constants are:

Specific gravity (15.5°C) ...	0.870—0.873
Flash point (Abel closed cup) ...	690°F (20.5°C)
Crystallising point	—17.70°C
Refractive index	1.456 at 25°C
Distillation range (95%) at 760 mm.	132°C—136°C
Amine content	greater than 99%
pH of 100 ppm. solution in water	10.5

Cyclohexylamine is a clear, practically colourless liquid with a characteristic ammoniacal odour. It is readily miscible with water and with most organic solvents, including alcohols and hydrocarbons. The product distils without decomposition and forms a constant boiling mixture with water containing 44.2 per cent by weight of cyclohexylamine and distilling at 96.4°C under 760 mm. pressure. It is stable up to 450°F.

This organic base is said to be stronger than ammonia and ethanolamines and that it forms stable salts with mineral acids, and soaps with long chain fatty acids. There is a high affinity for carbon dioxide which it absorbs from the air. The very reactive amine group undergoes the typical amine reactions including the formation of secondary and tertiary amines. Both hydrogen atoms attached to the nitrogen may be replaced by various functional groups. With carbon bisulphide, cyclohexylamine forms a dithiocarbamate. It condenses with aldehydes, ketones and oxides.

As far as action on metals is concerned there is no action on iron, stainless steel or tin; cold, it attacks copper and copper alloys, lead and zinc; hot, it attacks nickel and aluminium.

In handling, this new product is caustic and toxic. Skin contact should be avoided, but if it should occur, the affected area must be washed immediately. If accidentally swallowed, vomitting should be induced by administering salt water and a doctor called. Breathing of cyclohexylamine vapour should be avoided.

Rediweld Start Courses in Welding PVC

FOLLOWING THEIR recent move to new and larger premises at 17/27 Kelvin Way, Crawley, Sussex, Rediweld Ltd., chemical engineers, have been able to provide sufficient room for the installation of a well-equipped school for the welding of thermoplastic materials. The first of its kind in this country, the school was established because the welding and fabrication of thermoplastics was becoming an established method of manufacture.

Rediweld will hold every month two complete courses, each lasting a fortnight. The first week will deal with the welding and fabrication of polythene, while the second week will cover the welding and fabrication of p.v.c. It will also be possible to take only a one-week course in the welding of either polythene or p.v.c.

COMMERCIAL PRODUCTION OF SYNTHETIC FIBRE PAPER FORESEEN WITHIN YEAR

COMMERCIAL PRODUCTION of paper made from synthetic fibres is foreseen within a year, according to leading US paper manufacturers and E.I. du Pont de Nemours and Company. This speed-up of commercial availability has been made possible through the solution of many technological problems sooner than originally anticipated.

Recent developments resulting from du Pont research, for example, have been specially treated papermaker fibres of nylon, Dacron, polyester fibre, and Orlon acrylic fibre, and the development of special cutting techniques which permit cutting these fibres to short lengths without fibre fusion or presence of long fibres.

Fibres can be obtained in ¼ in and ⅛ in. lengths with a diameter of 0.7 mils (3 denier). A broader range of fibre lengths and deniers will shortly be available.

With the co-operation of leading paper companies, the use of synthetic fibres in papermaking has grown from laboratory production to semi-commercial availability in three years. A diverse range of appearances and characteristics is possible, ranging from drapable fabric and felt-like structures to crisp papers of tough parchments.

Papers made from synthetic fibre show excellent resistance to corrosive chemicals, bacteria, heat and moisture, as well as high strength, outdoor durability, excellent dimensional stability, and good dielectric properties. Because of their unique properties, synthetic fibre papers will be confined to specialty paper markets and those markets now held by woven fabrics. There will be little encroachment on existing paper fields.

Solution Imminent

While a number of production problems remain to be solved, their solution appears imminent and emphasis has now been placed on end use studies. Industrial end uses with considerable promise, many of which are now being field tested, include electrical insulation, backings for coated fabrics, map and chart paper, filtration, light-duty tarpaulins, replacement for multi-wall bags, and felt-like structures for low and high pressure laminate reinforcing batts.

While research has shown that specialty papers with a wide range of physical and functional properties can be prepared from synthetic fibres and from blends of synthetic fibre and pulp, they will cost more than conventional papers. Preliminary end use studies, however, indicate they can compete in applications where their properties offer specific advantages.

An outstanding property of the papers is their high strength. Tear strength is stated to be 10 times as high as a good kraft paper and is, in fact, in the range of that of woven fabrics. The fibres and binders are also virtually unaffected by water, hence these synthetic-fibre papers retain their high strength when wet. They are resistant to heat, chemicals and weathering and they have a marked tendency to resist dimensional changes with changes in humidity. According to the choice of binder, so the papers can be made transparent, resistant to crazing and cracking.

Investigations to date indicate that either nylon or Dacron polyester fibre with wood pulp can be used as a replacement for woven cotton as the backing of vinyl coating. With regard to economic aspects, it appears that a 19 cent a yard paper can replace a 25 cent a yard woven fabric.

Papers of 100 per cent Dacron polyester fibre are proving of value in the electrical field because of their good electrical properties and resistance to high temperatures.

Ramsay Fellowships for Advanced Chemistry Students

THE RAMSAY Memorial Fellowships Trust announces that applications for two Ramsay Memorial Fellowships for advanced students of chemistry will be considered in June. One of the Fellowships will be limited to candidates educated in Glasgow.

Value of each Fellowship will be £600 per annum, to which may be added a grant for expenses of research not exceeding £100 per annum. Fellowships will normally be tenable for two years.

Full particulars can be obtained from the joint honorary secretaries of the Trust, University College London, Gower Street, London WC1. Completed appliration forms must be received not later than 18 April 1957.

New ICI Film

Visit of the Queen and Prince Philip to the ICI Ltd. chemical plant at Wilton in June 1956 is the subject of a new eight-minute colour-film.

Correspondence

'Hot Dip Galvanising Has Place In Chemical Industry', says Association

SIR, We were surprised to see that the article on 'Non-ferrous metals as protectives' in the series 'Corrosion problems in chemical factories' (CHEMICAL AGE, 23 February, p.331) made so slight a reference, and that misleading, to the use of galvanising in the chemical industry. On behalf of the Hot Dip Galvanisers' Association whose membership comprises the general galvanisers in the UK, we should like to correct the erroneous impressions given.

Your contributors state that galvanising is suitable only for small items, but this is not the case. Many galvanising pots in the UK are up to 20 ft. long and 7 ft. wide, and some narrower ones, designed for dipping long structural sections, are 30 to 35 ft. in length. But even so, structures far too big to go into the pot are regularly galvanised by dipping their components before assembly. In this way the Crystal Palace television tower, for example, and degreasing plants, bridges, electricity pylons and the hulls of ships are given the exceptional protection against rust which a zinc coating provides. Although the size of articles which can be coated with zinc by electroplating or sherardising is limited, no such restrictions apply to hot dip galvanising or metal spraying.

Many thousands of tons of galvanised steel are used each year by chemical firms; one of the largest in the country uses galvanised drums to hold carbon disulphide, trichlorethylene, spirit wet nitro-cellulose, organic solvents, chloroform, sodium cyanide, methylene chloride, orthodichlorbenzene, diethyl carbonate, sodium peroxide, dyes, paints and bleaching powder.

The extensive use of galvanised steel in agriculture is familiar to everyone; feeding troughs, cow stalls, sterilisers, wheel-barrows, barns etc., are regularly galvanised and consequently galvanising is frequently used in contact with agricultural chemicals.

Recently, the tanks of ships and road vehicles used for transporting chemicals in bulk have been zinc sprayed with outstandingly good results. Acetone, methyl ethyl ketone, isopropyl alcohol and glycerine have been carried without any contamination or discoloration, and tests made after five years indicated that the zinc coating would be good for another fifteen. The tanks could have been hot dip galvanised had it been decided to coat them with zinc before installation and, thickness for thickness, the coating would have been equally effective.

As galvanised steel is highly resistant to attack over a wide pH range, it is also used to store a variety of aqueous solutions.

Yours faithfully,
G. R. GRICE,
Technical Officer.
Zinc Development Association,
London W1.

Change of Address

Due to continued expansion, the Middlesborough branch office of Honeywell-Brown Ltd., chemical engineers, has moved to larger premises. All inquiries concerning industrial instrumentation, heating and air conditioning controls, and precision switches, should be addressed to the company at 52-60, Fletcher Street, Middlesbrough (Middlesbrough 44221).

ELECTRIC WELDING SPEEDS GLASS PIPELINE OUTPUT

New Methods at Sunderland Factory

ELECTRIC welding is the newest technique in the production of QVF visible-flow glass pipeline introduced by James A. Jobling and Co. Ltd. at their works on the Pallion, Sunderland, trading estate. This development has led to increased output and has enabled the fabrication of articles in thick Pyrex chemical-resistant glass that were previously either extremely difficult or even impossible to obtain by existing methods.

All the glass for this and other industrial glassware produced at Pallion is made by Joblings at their Wear glassworks, Millfield, Sunderland. It is marketed solely by QVF Ltd. In addition, Joblings produce all the glass used by Quickfit and Quartz Ltd., a subsidiary of the Triplex group, at their Stone, Staffs. works. This production is also marketed by QVF Ltd. Joblings have a 49 per cent interest in QVF and Triplex a 51 per cent interest.

The new electric welding machine, seen last week by a member of the CHEMICAL AGE reporting staff, was made by Joblings specially for their Pallion factory and was designed to weld large diameter pipeline. One of the main advantages of this method is its ability to heat glass rapidly and locally.

Conducts Electricity

The process is based on the fact that above a certain temperature Pyrex, a borosilicate glass, becomes a conductor of electricity so that electrical energy can be absorbed. The resulting heat formation rapidly raises the temperature to the point where the glass is fluid so that it can be worked and blown in the usual way. In the heating of thick wall section material by oxy-coal gas heating, glass is a poor conductor, as it is difficult to transmit heat from the outside of a tube to the inside. The new process enables the absorption of electrical energy in depth and does not depend on heat conduction to raise the temperature throughout.

The actual zone of application can also be kept to a minimum, compared with the spread of heat over a wide area that results from the use of large powerful oxy-coal gas flames. The electric current at 50,000 volts is transmitted to the glass on gas electrodes.

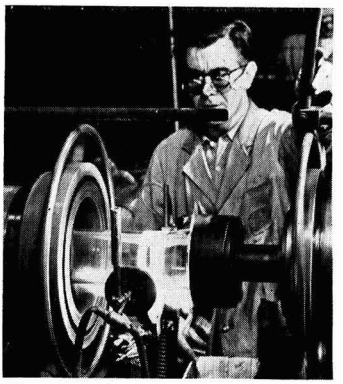
The latest glass-working lathe at Pallion is a Dupex four-headed Heathway model used for joining long lengths of pipeline to ensure coaxial alignment. This lathe, consisting of two independent lathes that can be coupled to form one lathe giving an 18 ft. overall working length, also ensures the production of absolutely straight pipeline. The Pallion plant, which is capable of turning out more than five miles of glass pipeline a day, has produced pipeline in lengths of 25 ft. and 5 in. in diameter.

QVF visible-flow tubing reaches Pallion for finishing and assembling processes from Jobling's Wear glassworks. The decision to increase production stems from a steady rise in demand from chemical and allied manufacturers for visible-flow pipeline. Industries using the product for the handling of corrosive and other liquids include chemicals, pharmaceuticals, distilleries, soft drinks, atomic energy and dairy farms.

Production of glass on Wearside has a long tradition, having been started in Sunderland in about 647 AD by Frankish monks for the windows of the monastery of St. Peter. By the 1850's there were nine glass-making concerns, one of the principal being the Wear Flint Glassworks. These were acquired by James Augustus Jobling in 1885.

One of the main factors that brought the Joblings to the forefront in the field of glassware was their purchase of the patents for Pyrex heat and chemical resisting glass from the Corning Glassworks in the US. Production of Pyrex started at Sunderland in 1921—now it is the standard form of glass for all the products manufactured there.

A borosilicate glass of low alkali content containing no elements of the alkaline earth group, no zinc and no heavy metals, Pyrex is highly resistant to the attack of water and all acids, except hydrofluoric and glacial phosphoric acid. A low co-efficient of thermal expansion, enables this visible-flow glassware to withstand a high degree of thermal shock. The extent of the sudden temperature reduction that can be survived depends, of course, on the shape and dimensions of the glassware.

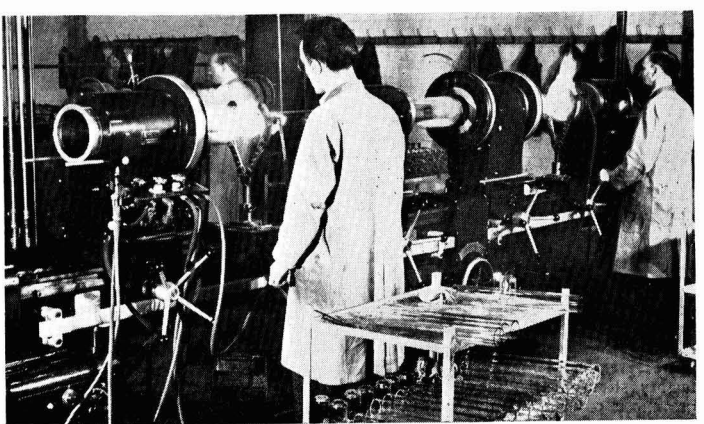


Electric welding of visible-flow glass pipelines at Joblings Pallion factory

In the ' glasshouse ' at Millfield, we saw all the stages in the production of chemical-resistant pipeline. First molten glass flows out of the vast glass-making furnace along a channel to a fore-hearth from where it is drawn 70 ft. up a drawing tower. The smaller the bore of the tubing, the faster the rate of draw. These towers can draw tube from a diameter of less than $\frac{1}{4}$ in. up to 5 in. The pipeline is broken off at the top of the tower into lengths of 5-6 ft. by a 'cracking-off' process. Five inch pipeline comes up the tower at a rate of 2 ft. a minute. QVF 18 in. glass pipeline, claimed to be the largest in the world, is not drawn in this manner, but is mould-blown.

After cracking-off, the pipeline is packed in lengths in trays and sent by chute to the store for sorting, re-gauging and transport for final fabrication to Pallion. This store holds 265 tons of pipeline, equivalent to 1,000 miles. By this stage the pipeline has already been checked by gauge half way up the tower, a gap-gauge being used.

When we visited Sunderland we learned that Joblings had just succeeded in overcoming the difficulties involved in the production of oval pipeline in response to export enquiries. One of the main advantages is a considerable saving in space



Triple-headed Heathway lathe for the production of long lengths of straight pipeline by the electric welding process

occupied by certain patterns. Another interesting development has been the production of sintered glassware and Joblings are proud of the fact that in quality their product is fast approaching the standard of the West Germans who for long have led in this form of filtration. At present the Millfield works cannot keep pace with a mounting demand.

One of the most intricate pieces of laboratory glassware now being made on a production basis to fine limits of accuracy is the Oldershaw perforated plate column for accurate analytical batch distillations. With low HETP, and suitable for corrosive liquids, it is of particular value for the analysis of hydrocarbon mixtures. The model we saw had more than 30 perforated glass plates sealed in a tube. Each plate with its nearly 100 hand-drilled exactly-positioned holes of uniform bore, has a baffle to direct the flow of liquid, a weir to maintain a liquid level in the plate and a drain pipe. We learned that each column involves about 13 hours' work on the part of a highly skilled craftsman.

A recently developed product—first marketed last October—that caught our eye at the Pallion works was a glass sink trap waste for laboratory use. Solids fall to the bottom of the trap while liquids pass away to the waste outlet; these solids are easily removed by undoing a simple spring clip at the base of the trap. Since October orders worth £42,000 have been executed and enquiries for about £100,000 of these traps have been received.

Throughout the works the time-honoured craft of hand-blowing goes on alongside more modern methods, ranging from electric-welding to the practically 100 per cent automatic production of test tubes. At present about a third of the production of industrial chemical-resistant glassware is exported. Increasing demand from the chemical industry for visible-flow pipeline is being met by the expansion of production facilities and of installation of more of the most modern machines.

SMOOTHING AND PROPORTIONING EQUIPMENT FOR FERTILISER MANUFACTURE

PARTICULAR STRESS was laid on smoothing and proportioning equipment in fertiliser manufacture in a paper by A. C. van Es of the Albatros Superfosfaatfabrieken N.V., Netherlands, read before a recent meeting of the Fertiliser Society in London.

Two smoothing problems were noted in connection with sulphuric acid factories, which are more or less related to the proportioning of the weight of sulphur compound to be burnt or roasted against the volume of combustion air.

At this Dutch fertiliser factory a wet contact plant, burning hydrogen sulphide, is in operation, and an interesting gas regulator, the autoselector, both in the hydrogen sulphide line and in the steam line of the contact sulphuric acid plant has been installed. The autoselector is controlled by flow as well as by pressure. The top is operated by pressure over an orifice in the H_2S main, the bottom by pressure in the main itself. By means of two pneumatic systems, the three separate measuring systems control one regulating valve: also by pneumatic systems, too great a flow is cut off and too low a pressure shuts the valves until a pre-set pressure is again reached. The maximum hydrogen sulphide available from a neighbouring refinery is thus available, while the bottom regulation ensures that there will be no air blow-back into the hydrogen sulphide pipeline. An increase in production of from ±50 to 60 tons a day was achieved, Mr. van Es reported.

Another autoselector has been installed on the waste heat boiler used to cool the roast gases. To prevent corrosion, boiler pressure is maintained at 18 atmospheres pressure. Before feeding into the factory steam distributing lines, steam pressure is reduced. A valve is regulated by the auto-selector by two measuring and control systems, working on the pressures before and after the pressure reduction valve. Thus pressure and temperature of the boiler are maintained at a uniform level.

A regulator of the same type has also been installed on the waste heat boiler connected with a fluosolid pyrites roaster.

Proportioning of cooled roaster gas which has passed the heat exchanger, and of roaster gas which bypasses it, is effected by a valve operated by a temperature controller which brings the mixture to the exact temperature required by the SO_3-converter.

In the manufacture of phosphoric acid a constant speed belt weigh is employed which mechanically operates a flow by a valve, coupled with a Howard feeder for sulphuric acid. This system is stated to operate well.

The reaction vessels used are comparatively large in relation to the P_2O_5 formed (two to five cubic meters per ton of P_2O_5 a day), thus smoothing out irregularities in the feed by countering retention time.

A third improvement reported by Mr. van Es was the constant level kept in the hopper by an overflow back to the large ground rock hopper, from which the weigher is fed by elevator and screw conveyor. Easier regulation of a screw or a pocket valve by pneumatic or by the indirect action of the weighing belt by electrical means is suggested.

Electrical Power Convention

One of the main papers to be given at this year's British Electrical Power Convention, to be held at Eastbourne from 17 to 21 June, will be 'Nuclear Energy in Great Britain.' The joint authors are Mr. J. C. Duckworth, deputy chief engineer (nuclear power), Central Electricity Authority, and Mr. W. H. C. Pilling, CEA project engineer. Another session of the convention will be devoted to electricity supplies for industry.

Officers Elected at SAC Annual Meeting

OFFICERS for 1957 were elected at the annual general meeting of the Society for Analytical Chemistry, held in Burlington House, London W1 on 1 March.

Dr. J. H. Hamence, who has been honorary treasurer for the past eight years, becomes president in succession to Dr. K. A. Williams. Past presidents serving on the council are: Dr. D. W. Kent-Jones, Dr. J. R. Nicholls, G. Taylor and Dr. K. A. Williams. Vice-presidents are N. L. Allport, Dr. J. Haslam, A. A. Smales.

Honorary treasurer is Dr. A. J. Amos, honorary secretary, Dr. R. E. Stuckey and assistant honorary secretary, S. A. Price.

In his address as the retiring president Dr. Williams referred to the history of the society. As was to be expected, he said, for at least half of the Society's life the retiring president's address had been devoted to food and food adulteration. The SAC, he said, had been formed originally for investigating these subjects.

The importance of showmanship in the presentation of papers was stressed by Dr. Williams. It was found that three papers on a single subject were better than three papers on different subjects. Everyday subjects were better received than academic ones.

Obsolete Ports Raise Prices of Imported Chemicals

THE PRICE Britain pays for certain imported chemical raw materials is high in comparison with the cost to certain continental competitors. This is disclosed in an article in the *Manchester Guardian* of 4 March.

The reason is the increased rates of freight required as an inducement to accept cargoes for UK destinations. These extra freights help compensate for the higher costs of discharging in the UK and to make up for the excessive times that ships have to spend in British ports. Obsolete handling and unloading methods are the reason. On the other hand most of the large continental ports are now highly mechanised and equipped with the most modern devices for speedy and efficient handling of cargoes.

The following figures were given to show the advantage enjoyed by European importers:

PYRITES FROM HUELVA
To Rotterdam 40s. a ton. To UK 50s. a ton.
SULPHUR FROM US GULF
To Continent 107s. 6d. a ton. To UK 127s. 6d. a ton
ROCK PHOSPHATE FROM CASABLANCA
To Rotterdam 38s. a ton. To UK 46s. a ton

Sales Agreement on Flame Hardening Equipment

Under a new agreement between Wild-Barfield Electric Furnaces Ltd., Elecfurn Works, Otterspool Way, Watford, and Paul Ferd, Peddinghaus, of Gevelsberg, Germany, manufacturers of flame hardening equipment, the German firm have been appointed sole agents for the sale and servicing of Wild-Barfield AHF induction heating equipment in Germany. Wild-Barfield now have the right to use Peddinghaus designs of handling fixtures for use on induction heating applications.

Rheological Method Advocated for Paint Evaluation

OCCA London Section Meeting

A SUBSTANTIAL measure of success by the adoption of a rheological method for the evaluation of the flow, sag and settlement characteristics of paints is claimed by Mr. D. J. Doherty, B.Sc., and Mr. R. Hurd, B.Sc., A.R.I.C., of Imperial Chemical Industries, Ltd., Dyestuffs Division, who presented a paper on 'The preparation, properties and rheological investigation of thioxotropic paint systems', at the February meeting of the London section of the Oil and Colour Chemists Association.

Some of the fundamental work and the theory and methods used were dealt with by Mr. Doherty, who described a test in which the thixotropy of a system was sheared out, after which it recovered. The instrument had an inner and an outer cylinder. The outer cylinder rotated at constant speed, and the torque transferred to the inner one was measured through a spring on a scale.

Interpretation of the rheological measurements and their correlation with practical results was discussed by Mr. Hurd. Describing some of the practical routine tests, he said that to deal with the property of hold-out, they had sealed various surfaces, covered the surfaces with the paints under test and examined the differences in shade. A simpler test was to paint a shellac cross on cardboard and paint over the whole surface. If a paint had poor hold-out, the cross could be seen underneath it, but if it had good hold-out the cross could not be seen. The conditions in such tests, of course, were more severe than in practice.

Pigment Settlement

For pigment settlement resistance they used the conventional method; they had found no really satisfactory quantitative method. To eliminate a large series of brushing trials for sag resistance, films of 3, 7 and 10 thou. were drawn down on plate glass, and the glass was immediately placed vertical.

The effects of a number of pigments and extenders were also assessed.

In a high proportion of the samples tested, good agreement was reached between the theoretical predictions and the practical results. Unfortunately the accuracy of some measurements (particularly those at very low shear rates), said the authors, left something to be desired; but a new instrument, specially designed for that work, was under construction.

Other methods mentioned for routine practical testing of the sag resistance and flow properties of thixotropic paint systems were simpler to carry out than a rheological investigation and would often provide adequate information. A rheological investigation, however, was, the authors considered, most valuable when evaluating new materials, since the technique gave basic information of a research nature. In addition, it was the authors' experience that when matching given paints for sag resistance, flow and pigment settlement resistance, the plotting of rheological curves was often a time-saving approach, since trends towards the desired result could be detected.

Investigations described in the paper indicated that, if a paint had even a small amount of thixotropy, hard pigment settlement did not occur. Sag resistance, flow and hold-out depended, not on the degree of thixotropy, but on the initial rate of recovery of thixotropy, as well as the stress-strain characteristics at low shear rates.

Discussion

An interesting discussion ensued at the end of the paper.

On the question of thixotropy due to pigments and extenders, a speaker felt the difficulty there was the possibility of different pigment packing arrangements when a film had been created, and in the case of the absorbent substrates an opposing capillary resistance had to be considered. He would have thought that the amount of hiding achieved would depend very largely on the amount of medium left in between the substrate and the film. In the general measurement of thixotropy and correlation with behaviour it seemed to him that there might be some weakness due to the fact that the moment one created a film, evaporation, absorption, and so on, set in.

Mr. Hurd, on the question of sinkage into porous substrates, said the authors' test was developed after they had done some practical trials on plastics board, then on building board and on cardboard. They had some experience that a paint which they knew gave a patchy appearance on the wall, gave a patchy appearance in their test. For instance p.v.a. emulsion paints had excellent hold-out; that was one of their great attractions.

On the question of correlation with behaviour, Mr. Doherty said they were aware, of course, of the solvent effect and they did not guarantee that the curves gave good correlation for more than the first half minute, or something like that. But he mentioned a test in which a square box, containing an agitator, was used, and in the bottom of which they placed medium and solvent in the proportions in which they existed in the paint. With that test they obtained correlation with the curves for a much longer period. They did not claim that the curves were quantitatively correct; they were only qualitatively correct

When asked if the authors had detected that a paint which had good hold-out had given bad adhesion, Mr. Hurd said that was a matter which had worried them to some extent at first, but they had no evidence that that was so. They had tried out those things with undercoats and gloss coats in thixotropic media and there had been no sign of loss of durability.

A speaker, referring to hold-out and non-penetrating properties, suggested that the difference between the polyamide type of alkyd and the talc system and Winnofil P.I. system could be explained purely on the basis of structure. In the polyamide system there was a thixotropic medium and therefore there was a tendency to get a little penetration; in the case of talc the medium viscosity was still low and there was a capillary effect into the cardboard which was not really influenced by the talc, as its particle size was very high in relation to the pore size. With Winnofil P.I. a particle size of the order of one micron had been obtained and the pigment particles could easily block up the pores in the cardboard.

Mr. Hurd, on the question of hold-out, rather agreed that it was a molecular weight effect with the polyamide alkyd; an improved hold-out could be obtained by cooking the alkyd. Talc produced a highly thixotropic system and it did not hold out. There might have been in the literature sometimes a general assumption that if a paint were thixotropic it would sit up but that depended on a lot of factors.

Another speaker discussing hold-out, said he had examined paints made with thixotropic vehicles and high viscosity alkyds and using resins which in the final paints gave equal resin solids. Complete hold-out or complete absence of hold-out was possible according to the formulation. With similar resin solids he had not found any difference. Mr. Hurd commented that medium oil length alkyds could be produced with really excellent hold-out—a non-thixotropic system.

ICI Plan to Expand Nitro-chalk Plant

Expansion of the Nitro-chalk plant at the Heysham factory of ICI Ltd., Billingham Division is being planned. The plans for increased capacity include novel features in various sections of the new plant, all of which will be specially designed.

The company is to apply for planning permission to proceed with the project—in fact the first meeting with the Planning Authorities was held on 21 February—and until this has been granted no further statement can be made concerning the date on which the plant could be commissioned.

AEA Not to Show at BIF

The UK Atomic Energy Authority has decided not to exhibit at the 1957 British Industries Fair, but is to stage a major display at the Safety and Factory Efficiency Exhibition to be held at Birmingham from 14 to 21 June. Stating this in the House of Commons last week, the Paymaster General, added that the participation of manufacturers of atomic energy equipment in the BIF was a matter for them.

PERKIN TRUST RECEIVES £36,000 AND PROMOTES EDUCATIONAL AWARDS

DETAILS of the awards of the Perkin Centenary Trust have now been announced. The Trust was established to commemorate the discovery of mauveine by William Henry Perkin in the year 1856.

The debt to Perkin was acknowledged by celebrations held in London in 1956 to commemorate the centenary of his discovery. These were supported by organisations interested in chemistry, including The Royal Society, The Chemical Society, the Society of Chemical Industry, the Society of Dyers and Colourists, the Royal Institute of Chemistry, and the Association of British Chemical Manufacturers. A joint committee of these bodies invited contributions from industrial organisations to a fund to commemorate the event and to be used for the advancement of the study of colouring matters and their application. The Trust was established and some £36,000 has been received or promised so far, now the trustees have announced a number of awards to promote technical education in any aspect of the manufacture or the application of colouring matters.

The Perkin Centenary Fellowship: Offered for one or two years to a graduate for the purpose of higher study. Valued at £600 per annum, it is tenable at any university, technical college, or other institution, approved by the Trustees. Applications, on forms available from the Secretary, must be received not later than 1 May 1957.

The Perkin Centenary Scholarship: Two such awards, valued at £300 per annum are to be offered, each for two years, renewable at the discretion of the trustees for one further year, to enable candidates employed in an industrial firm or other institution concerned with the manufacture or the application of colouring matters to receive an education at a university or technical college. There will be no means test for the award, and a successful candidate is not debarred from receiving the whole or a part of his normal salary from his employers during his tenure of the Scholarship. Applications, on forms available from the secretary, must be received not later than 1 May 1957.

Perkin Exchange Lectureships: Short Term: An appointment will be made from time to time by the Trustees to enable a senior teacher at any appropriate university, or technical college, or other institution, to visit some similar establishment overseas in order to deliver a short course of lectures. In return, a visit to a British institution by some overseas scientist will be arranged. Longer Term: A second appointment contemplated will permit the exchange of lecturers for a period of up to one year between comparable institutions in Britain and overseas.

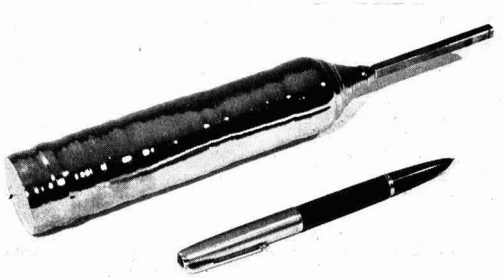
The trustees are Mr. H. Jackson (chairman), Dr. D. W. Hill, Dr. L. H. Lampitt, Mr. W. R. Mathers, Mr. M. W. Perrin, and Sir Robert Robinson. Secretary to the Trustees is Mr. J. R. Ruck Keene, to whom inquiries relating to the above awards should be addressed, c/o The Chemical Society, Burlington House, London W1.

GEC Produce One of the World's Largest Single-Crystal Germanium Ingots

ONE OF THE largest single-crystal ingots of germanium in the world has been grown recently at the research laboratories of the General Electric Co. Ltd., where a research programme on transistors and other crystal valves is in progress.

The ingot, which is about 8 in. long and weighs 1,200 grammes took six hours to grow. It was produced by a process involving the slow withdrawal of a rotating 'seed' crystal from a pool of molten germanium. GEC developed this technique to the stage where large crystals such as this can now be grown automatically with consistency and uniformity.

The value of the ingot is approximately £650 and the impurity content is controlled to a value of less than one part in 20 million. In the manufacture of crystal valves, the production of such large diameter crystals results in considerable savings in cost. When the ingot is sawn into wafers, less material is lost as waste from the trimming of the outside and ends.



One of the largest single crystal ingots of germanium in the world, grown recently at the GEC research laboratories

Plastics-coated Steel Process Developed by BISRA

A PROCESS for producing steel sheet or strip with a bonded surface of polyvinyl chloride plastic in the form of a continuous laminated strip has been developed by the British Iron and Steel Research Association. This process is believed to be the first in the world to produce plastic-coated steel in a continuous strip, for although the US has produced similar coated steels these have been manufactured in the form of laminated sheets.

Bonding of the coating is stated to be strong enough to enable the plastic-coated steel to be bent, crimped, sleeved or even deep drawn. The plastic coating also enables steel to be produced which is finished in a wide variety of colours and with either a plain or embossed surface. As the coating also resists abrasion, atmospheric corrosion and chemical attack, it is very suitable for use in chemical tanks and in the manufacture of industrial roofing and wall panelling.

Experimental production of the laminated strip is already being undertaken on a pilot plant at BISRA's Swansea laboratories. It is understood that there are still some manufacturing problems to be solved.

Bitumen Impervious to Rising Dampness

A HOT-POURED bituminous compound, Ventrot, evolved by British Bitumen Emulsions Ltd., has been studied in detail in connection with problems of 'rising damp'.

Floor coverings such as linoleum, wood blocks, plastic tiles etc., which are stuck down on concrete floors are liable to troubles such as blistering, mould growth and lack of adhesion, mainly caused by rising damp in either liquid or vapour form.

In practice all concretes, however produced, absorb water. Passage of water can be stopped by damp proof course of asphalt, bituminised felt, metal sheeting, etc. During the last war, however, the Ministry of Works used a sandwich membrane of hot poured bituminous compound. Such a hot poured bituminous compound is Ventrot, the characteristics of which are those arrived at by the Building Research Station and the Ministry of Works in their war time studies.

Ventrot is a blend of residual bitumens applied $\frac{1}{8}$ in. thick to a solid subfloor and over which an even screed of two inches in thickness is laid in preparation for the floor finish. Base concrete should not be less than three inches thick with a close textured even finish. The concrete should be allowed to set and become reasonably dry on the surface before applying the compound. Prior to pouring the hot bitumen it is recommended that a priming coat of bitumen emulsion should be brushed over the surface, 20 square yards per gallon and allowed to dry completely. A two inch screed may be laid over the membrane immediately after cooling.

OCCA EXHIBITION PREVIEW

New Developments in Paint and Allied Industries to be Shown

MANY new developments will be displayed at the ninth technical exhibition of the Oil and Colour Chemists' Association, to be held at the Royal Horticultural Society's New Hall, Greycoat and Elverton Streets, London SW1, on 12, 13 and 14 March.

The exhibition will be the largest yet organised, 87 companies and research associations taking part. The theme is the presentation of technical advances in those industries supplying the paint, varnish, printing ink, linoleum and allied industries. The technical advances relate to new products, new knowledge relating to existing products and their uses and, in some cases, existing knowledge which is not generally available to the consuming industries.

The new developments to be displayed at this year's exhibition are numerous with nearly every exhibitor having at least one new or modified product to introduce. For the benefit of visitors to the exhibition we give below details of some of the more interesting exhibits. Stand numbers are included in each case.

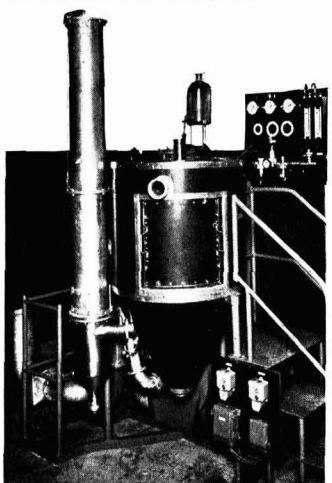
The display by **Aero Research Ltd.**, Duxford, Cambridge, will illustrate the properties and applications of the Araldite range of epoxy resins for the surface coatings industry. Since last year, two new specialist products have been introduced—a cold curing, epoxy stopper, Araldite 880-AB, and a stoving resin, less sensitive to curing conditions at high temperatures, Araldite 981-AB.

Araldite stopper resin 880-AB is an ethoxyline resin system supplied as two viscous, solvent-free components, to manufacturers for use in the preparation of transparent or pigmented stoppers, which cure in a reasonable time at room temperature or more quickly at elevated temperatures. Curing takes place with negligible shrinkage and is independent of the presence of oxygen. Comparatively thick coats can thus be applied, and rough surfaces, holes and cracks can be filled in a single operation. The company states that adhesion to most materials is excellent and priming is unnecessary.

Stoppers based on Araldite 880-AB can be used as the sole coating on light alloys, iron, steel, wood and brickwork or, after curing, further coats of other finishes can be applied e.g. nitrocellulose lacquers and stoving enamels. Cured stoppers are said to have good heat, acid and alkali resistance, which is improved by curing at elevated temperatures. Curing at higher temperatures is also said to improve the solvent-resistance of coatings. Stoppers based on Araldite 880-AB have a pot life of about 1½ to 2 hr. at room temperature.

Finishes based on Araldite 981-AB have a relatively wide stoving range and are suitable for use in fast, high temperature stoving ovens. At 240°C, for example, the stoving range is from three to 15 minutes, i.e. after three minutes curing the coating is solvent-resistant, but curing for as long as 15 minutes does not adversely affect the properties of the film. The lacquers may also be cured at lower temperatures and at 180°C, for example, curing times between 40 and 80 minutes may be employed.

Coatings based on Araldite 981-AB are suitable as internal finishes for collapsible tubes, cans and drums. The cured films are tasteless, odourless, and are said to possess excellent resistance to acids, alkalis and solvents. (*Stand* 57).



Kestner laboratory spray drier

Exhibits of **Kestner Evaporator and Engineering Co. Ltd.**, 5 Grosvenor Gardens, London SW1, will have, as their main theme, safe and controlled heating for the paint and allied industry.

The Kestner laboratory spray drier has been specially developed for use in the laboratory for pilot scale work, and is a compact and transportable machine. All the essential features of a full-size Kestner plant are present, including comprehensive instrumentation for adequate control.

The plant is fitted with the company's special high speed centrifugal atomiser, powered by compressed air. The drying air can be heated by either gas or electricity. The heater, has a maximum loading of 12 kW, or the equivalent in town gas. All contact parts are made in stainless steel, and the unit is designed for easy cleaning and maintenance.

From a commercial aspect, the drier is useful in the production and testing of small quantities of valuable materials. The product rate is approximately 2.5 lb./hr. corresponding to an evaporation of 5-10 lb./hr. depending on the material to be handled.

Also displayed will be a small synthetic resin plant arranged with the Kestner Wild-Barfield patent induction heating system and a range of small stirrers. (*Stand* 75).

To be featured by **Associated Lead Manufacturers Ltd.**, Ibex House, Minories, London EC3, will be calcium plumbate, a post-war development in anti-corrosive paint pigments—and now generally available for the first time and being marketed under the trade name Caldiox.

Described as a novel addition to the few existing rust-inhibitive pigments for the protection of iron and steels, calcium plumbate, like red lead, provides protection by a combination of basic and oxidising characteristics, as well as film-forming properties by interaction with linseed oil. It is believed to passify both cathodic and anodic areas on iron and steel, and in this respect differs from other rust-inhibitive pigments.

Linseed oil paints based on calcium plumbate have been found to be remarkably free from any tendency to crack and have good adhesion to iron and steel, timber and stone, zinc and new galvanising and to aluminium. Calcium plumbate is said to be particularly effective in marine atmospheres, presenting good resistance to blistering and rust-creep in conditions of intermittent immersion in salt water (*Stand* 81).

Abrac A, an epoxidised vegetable oil, is considered to be of such importance that **A. Boake, Roberts and Co. Ltd.**, Carpenters Road, Stratford, London E15, are devoting their whole display to this one product. Original research into the use of Abrac A as a stabiliser/plasticiser for chlorinated compounds such as p.v.c., chlorinated rubber and like materials, revealed that its epoxide groupings reacted with week organic acids to form neutral compounds.

The reactivity of Abrac A with fatty acids has made possible the formulation of a number of products said to have outstanding properties. This reaction is claimed to result in films with a greater degree of toughness, less residual tack, and better surface hardness than those obtained with normal drying oils. The reaction is also said to render Abrac A of great value in the manufacture of alkyd resins, resulting in a reduction in 'cooking' times and products with improved colour, hardness and adhesive properties.

Abrac A imparts anti-corrosive properties to oleo/resinous materials. This is thought to be due to the affinity of its epoxide groupings for metal surfaces, so that it cannot readily be displaced by moisture, acid, or other corrosive impurities. (*Stand* 35).

OCCA EXHIBITION

Development of resins for use in high speed photogravure magazine inks and resins for use in adhesives is carried on by **Fredk. Boehm Ltd.,** 19 Bentinck Street, London W1.

The two more important resins are Alpex 450J cyclised rubber resins, and Pioneer zinc resinate R.31.

Alpex 450J is a highly refined cyclised rubber resin in which insoluble matter has been reduced to the absolute minimum. It is said to be infinitely soluble and dilutable with toluene, xylene and SBP solvents and has very high solvent release properties. Used in conjunction with Pioneer R.31 it is said to impart a high degree of scuff resistance and improved definition. Its highly complex molecular structure is claimed to ensure excellent build.

Pioneer zinc resinate R.31 is a hard resin (m. pt R & B approx. 200°C) which has been specially formulated for use in conjunction with Alpex 450J. It has the necessary infinite solubility in the various solvents used, fast solvent release, good gloss and good pigment wetting properties. Pioneer R.31 can form the major part of the resin content of the ink.

Alpex 450J in solutions of light mineral oil also finds application in high class letterpress inks where its properties of 'filtration precipitation' in the pores of the paper are an advantage.

Another resin is Pioneer P.150, a high melting point (R & B 160°C) modified phenolic resin, easily soluble in oil, possessing rapid drying properties and scuff resistant properties for use in gloss, extra hard, non-scratch, chemical resisting and related type inks.

For aniline and flexographic inks Pioneer M.130 is of interest. This resin is very hard (m. pt. R & B 155°C) and has infinite solubility and gives stable solutions in methylated spirits. It has rapid solvent release and in addition to its use in flexographic inks, finds application in spirit photogravure inks suitable for food wrappers etc.

The company's resins for use in adhesives comprise various esters of modified rosins and terpene phenolic types. They are used to improve film cohesion, intensify surface tack and to increase bond strength. They find application in rubber base adhesives, for natural, reclaimed and synthetic, latex adhesives and chemical resistant adhesives based on chlorinated rubber. (*Stand 66*).

Results of recent research work into the can-stability of emulsion paints will be featured by **British Celanese Ltd.,** Celanese House, Hanover Square, London W1.

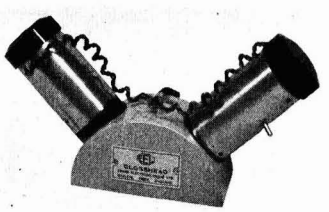
Charts, paint samples and paint panels will illustrate how the viscosity and consistency of paints on storage can vary widely not only with the amount of thickener, but also with the nature and amount of the wetting agent and the nature of the pigment.

This information is intended to indicate to paint manufacturers how Celacol, which is used as a thickener for emulsion paints in this country, can be used to better advantage through the appropriate formulation of these other paint constituents.

The Celanese stand will also feature trichlorethylphosphate, which is being employed as a fire retardant in products based on polyesters, cellulosics and polyurethanes. In particular, the effect of the incorporation of trichlorethylphosphate upon the inflammability of nitrocellulose lacquers will be illustrated. (*Stand 76*).

Evans Electroselenium Ltd., Potter Street, Harlow, Essex, will display various instruments which have particular applications in the paint and allied trades.

EEL photo-extinction sedimentometer, for measuring particle size, consists of a stabilised light source and a colimating lens which projects a parallel beam of light through a glass cell containing a suspension of power and through suitably spaced stops to an EEL photocell, the current generated being measured on an external galvanometer. By measure-



EEL gloss head for measurement of high gloss

ments over a period of time the instrument permits the determination of size frequency of a powder from which the specific surface of the powder may also be calculated. The instrument is designed to take six suspensions.

EEL powder reflectometer enables the specific surface of fine powder to be determined by the 'tinting strength' method. It comprises a six volt six watt light source rendered parallel by a suitable lens system and projected through suitable filters and an $\frac{1}{8}$-in. hole in the photocell on to the sample. The instrument may be used in conjunction with the galvanometer unit.

EEL gloss head, for the rapid and accurate measurement of high gloss, will also be shown. This instrument conforms to Methods Nos. 11 and 12 of Defence Specification 1053.

Other exhibits will be the EEL low gloss head, for the measurement of gloss in the region of matt finish to medium gloss; the EEL reflectometer Mark III, for routine measurements of total brightness and opacity; and the EEL reflectance spectrophotometer, approved by PATRA for the quick, accurate assessment of spectral characteristics of a colour, and for off-white measurements. (*Stand 6*).

The stand of **British Industrial Solvents** (a division of The Distillers Co. Ltd.), Devonshire House, Mayfair Place, London W1, will include a demonstration of the vapour phase chromatograph as a rapid means of identifying and determining the constituents of solvent mixtures and a section illustrating the effects on viscosity and surface finish of the changes which take place in solvent balance during the drying out of lacquer films. Results of some recent work on the occurrence of minimal flash point mixtures in binary solvent combinations will also be shown.

Another panel will demonstrate the special properties and performances of new p.v.c. plasticisers based on isodecanol, and will include a working model showing the value of antistatic plasticisers in reducing the fire hazards associated with coal-mine conveyor belting and similar industrial equipment.

A particularly interesting part of the exhibit will be devoted to the use of dioctyl maleate, dinonyl fumarate and other esters under development as co-monomers and internal plasticisers for vinyl acetate, a feature which should have a special attraction for technologists concerned with emulsion finishes based on vinyls. This part of the display will also include some applications of butadiene in resins and other derivatives. (*Stand 46*).

A new class of film-forming materials developed in the company's laboratories will be introduced by **British Oil and Cake Mills Ltd.,** Unilever House, London EC4. They are produced in the form of viscous oils that have excellent air drying properties and, being entirely free from ester groups, are not destroyed by caustic alkali.

Under suitable conditions, elastic linoxyn-like gels can be produced which will be of considerable interest to linoleum manufacturers on account of their high alkali resistance. This feature is thought to be of importance in many other industries using drying oils. (*Stand 63*).

The main exhibits of **British Oxygen Chemicals Ltd.,** Vigo Lane, Chester-le-Street, Co. Durham, will be devoted to Vandike polyvinyl acetate emulsions.

Results of recent investigations into the properties of p.v.a. emulsions and derived emulsion paints will be displayed, including the measurement of the pigment binding capacity of emulsions and the flexibility of plasticised films. Melamine, another BOC product of interest to the paint industry, will be shown. (*Stand 34*).

Arthur Brown and Co. Ltd., Bevis Marks House, Bevis Marks, London EC3, in association with **Smith Brothers and Co. (Oil Distillers) Ltd.,** 24 Marshgate Lane, Stratford, London E15, will display a comprehensive range of processed linseed oils.

The main product is Centrivar alkali varnish linseed oil processed by the Sharples continuous centrifuge system. For the printing ink trade there is a special processed linseed oil that is free from mucilaginous break and other materials likely to cause discoloration in processing. It will cook to the heaviest viscosities resulting in a finished product having a good colour and low content of fatty acids.

This exhibitor also introduced last year a range of enamel oils manufactured from linseed stand oil with tung oil to

OCCA EXHIBITION

produce oils which are more active and more closely approach the characteristics of tung oil than normal enamel oils. (*Stand 5*).

New developments in the alkyd field will be the main feature of **Cray Valley Products Ltd.,** St. Mary Cray, Orpington, Kent.

Medium oil length thixotropic alkyds are used for the manufacture of flat wall finishes either alone or in conjunction with conventional alkyds. Complete can stability derives from their use since the paint in its undisturbed state is jelly-like in structure. The finishes are said to brush easily and to be non-penetrating on porous surfaces.

A new alkyd for enamels to be introduced at the exhibition will show the effects of mixtures with conventional alkyds to produce a degree of structure sufficient to minimise pigment settlement, ease of brushability and give one coat obliteration without sagging.

Stimulated by greater use of emulsion paint which has a very low odour level, there is a demand for alkyd based finishes which can be used in hospitals, restaurants and factories where food products are manufactured. Such paints give off a less 'painty' smell during application and during the drying process. Commercially available alkyd resins incorporating these improvements will be on view in both the liquid and applied form. (*Stand 54*).

New and improved Polimul emulsions will be demonstrated in a range of new emulsions for use in the manufacture of paints, by **Dunlop Rubber Co. Ltd.,** Compositions Division, Fort Dunlop, Erdington, Birmingham 24. Also on show will be the results developed from recent research work on a variety of projects. (*Stand 29*).

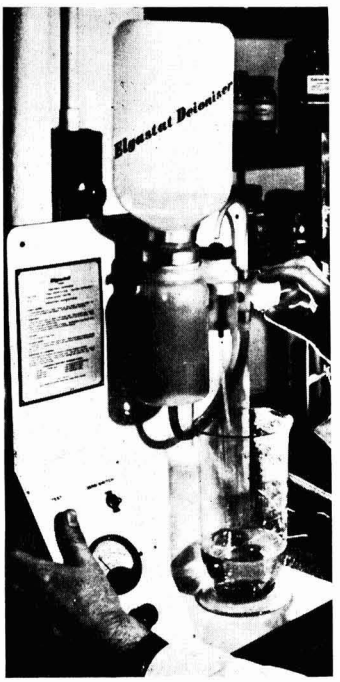
A complete range of Elgastat laboratory deionisers will be demonstrated by **Elga Products Ltd.,** Railway Place, London SW19.

The Elgastat laboratory deioniser type B. 105, a self-contained and portable deioniser for the instant production of purified water, may be used in any laboratory without external power supply, or for field research.

The storage tank is filled with tap or river water, which passes through a mixed bed of Elgalite ion exchange resins. Purified water, equal to three distillations in quartz, may be drawn instantly. Flow rates are up to six gallons an hour. The integral conductivity meter is energised by an internal B.126 dry cell (estimated life: six months). In this way, effluent quality can be checked constantly.

Elgalised water is free from trace metals, silica, chloride, sulphate, ammonia and carbon dioxide and has an electrical resistance of at least two million ohms/cm. Output depends on the total dissolved solids in the raw water, varying between eight and 75 gallons per cartridge.

The Elga portable conductivity meter Y. 1002, for checking effluent purity, will also be shown. The conductivity cell is detachable to ease filling and cleaning. Conductivity readings may be taken instantly on the meter which is calibrated in ohms/cm. (range: 50,000 to 4,000,000 ohms-cm.). A line cell is available as an optional extra and this may be fitted into the effluent line of an ion exchange plant or still.



*Elgastat deioniser type B.*105

Other exhibits will be the Elgastat minor, type C. 403, a miniature mixed bed deioniser for the purification of boiler condensate, and the Elgastat type B. 102, a laboratory model similar to type B. 105. (*Stand 4*).

Samples of thermometers and hydrometers for the oil and tar industries will be shown by **H. J. Elliott Ltd.,** E-Mil Works, Treforest Industrial Estate, Pontypridd, Glam. E-Mil Gold-line and Green-line brands of volumetric glassware including burettes, flasks, cylinders, pipettes, automatic measures, reagent bottles, stopcocks and nessler glasses will also be displayed.

The company's new brand of Amberline lead and antimony-free laboratory glassware and low actinic amber glassware for use with light-sensitive substances will be shown. (*Stand 12*).

Farbenfabriken Bayer Aktiengesellschaft, Leverkusen, Western Germany, will feature a combination of isocyanates and polyesters (trade names Desmodur/Desmophen) and the latest developments in their application to wood, anti-corrosion finishes and wire lacquers.

The products which emerged from the researches of Professor Bayer in the field of isocyanate chemistry, possess a degree of mechanical and chemical resistance that has opened up for them a wide use in surface coatings.

Farbenfabriken Bayer will also introduce for the first time the latest result of their research work—a new isocyanate with improved physiological properties.

The air-drying, unsaturated polyester resins (trade name Leguval) developed by Bayer are used (without the addition of air-excluding products) for finishes with a high gloss and suitable for stamping; they are notable for their hardness, elasticity, gloss and resistance to chemicals. They are used not only on wood and metal but also for plastics, e.g. unsaturated polyester resins with glass-fibre reinforcement.

Among the lacquer auxiliaries, a new product is being offered under the name of Auxol A1-paste, which serves to increase the shelf-life and prevents the premature fading of aluminium-bronze lacquers. (*Stand 17*).

A new thixotropic hard resin, Ennothix T.2, will be shown by **Leon Frenkel Ltd.,** Pomeroy House, 28a Basinghall Street, London EC2. Thixotropic paints based on this resin will demonstrate the gloss and brushability. This hard resin, the constants of which are closely controlled during manufacture, is said to assist in the production of paints having uniform characteristics from batch to batch.

Ennothix T.2 is compatible with alkyds and natural/synthetic resin media, and can be used as an anti-settling agent in long oil decorative paints. (*Stand 38*).

The Geigy Co. Ltd., Rhodes, Middleton, Manchester, have selected two facets of technical advance in the development of pigments for its display.

On one hand the firm will illustrate all its yellow pigments, including the new Nickel Azo yellow, as well as a number of new additions to the arylamide and benzidine ranges. This display is intended to place all these pigments in their proper perspective for the pigment user. The benzidines, for example, will range from the greenest highly transparent Irgalite Yellow 2GP—through the intermediate shades of Irgalites Yellow BR, Yellow BTR, Yellow BAW and Fast Yellow BAF—to the red shade pigment Fast Yellow BAR. The last colour has high strength and light fastness.

On the other hand prominence will be given to the increasingly important subject of pigment texture and dispersion. Big advances have been made in the production of softer powders and pigments are becoming available which disperse readily in the newer types of high-speed/high-output equipments which is now in increasing use. The ultimate aim of this work is the development of pigments which will disperse easily in the simplest of equipment for the production of low viscosity dispersions. (*Stand 51*).

Recent research in the laboratories of **John M. Hamilton and Co. Ltd.,** Humber Oil Works, Wincolmlee, Hull, has continued to be directed towards the production of various grades of processed oils most suitable for alkyd manufacture. In this connection the establishment of a

OCCA EXHIBITION

correlation between the properties of long oil pentaerythritol alkyds and the composition of the oils used for their manufacture, has been sought.

Some of the results of this investigation will be displayed on the company's stand this year, and the technical data presented will show in which way certain properties of the modifying oil can influence the behaviour of the alkyd resin during its manufacture, and also the final properties and performance of the resin. A number of processed vegetable oils for alkyd manufacture based on non-conjugated drying and semi-drying oils (and mixtures of these) have been evaluated in this programme. (*Stand 45*).

Hardman and Holden Ltd., Manox House, Manchester 10, will exhibit new developments in their range of Manox blue for printing ink, paint, cellulose and green manufacture and will report progress in their investigation of aluminium derivatives as modifiers of paint structure.

Two new types of Prussian blue will be on show. One is a dispersed quality suitable for gravure inks and cellulose lacquers, being quickly processed when ball milled in hydrocarbon solvents. Colour development is said to take place in less than one quarter of the usual time required for a normal Prussian blue and a further advantage is the brightness and greenness in undertone of this quality.

The second type has been developed for letterpress and offset inks as well as for use in paint, cellulose and green manufacture. It is felt that this range will show a considerable saving in grinding time whether processed by ball mill, roller mill or edge runner technique or in the laboratory. Tests have shown savings of up to 40 per cent.

One of the aluminium derivatives to be shown is Manalox 205, an aluminium organic compound of novel composition which will react at atmospheric temperatures with oils and resins. The *in situ* reaction complexes modify the structure of paint, conferring enhanced setting rate, controllable flow characteristics and improvement in pigment suspension, wetting and dispersion. It is claimed that the structural advantages imparted by Manalox 205 are not limited to decorative air drying gloss paints, but may be utilised in the formulation of non-penetrating flat paints and undercoats, sealing compounds and industrial finishes of many types.

Manalox 205 can be used to react at atmospheric temperatures with the paint after milling, or at elevated temperatures with the medium before pigmentation. (*Stand 41*).

Dymerex resin, a pale coloured, high softening point (135-150°C Ball and Ring), thermoplastic resin, said to have excellent resistance to oxidation and crystallisation, will be shown by **Hercules Powder Co. Ltd.,** 140 Park Lane, London W1. It consists of 80 per cent resin acid dimers, the balance of 20 per cent being monomeric resin acids, and a small amount of neutral material.

Advantages claimed are (1) manufacture of high melting esters and resinates, giving high viscosities together with good hydrocarbon solubility, particularly useful for heat set inks; (2) Dymerex may also be used in moisture set inks; (3) it can be used for extending shellac and imparting hardness and increasing resistance to blocking; (4) clear dispersions in glycol and alcohol can be prepared which are stable, and are capable of dilution to lower solids content.

Another exhibit will be resin 861, a new pale coloured (X; USDA Rosin Scale) modified rosin, said to have a high content of stabilised resin acids, low metals content of stabilised resin acids, low metals content, and to exhibit excellent resistance to oxidation and discoloration. It can be used as a basic material for producing ester resins, and metallic resinates required to maintain pale colour.

Pentalyn 830, a hard, pale coloured (max. N; USDA Rosin Scale), alcohol-soluble resin for use in flexographic inks, spirit varnishes, sealers and lacquers, will also be shown. With an acid value of 78 m.g. KOH/g., this product is compatible with a wide variety of film-formers, imparting good gloss, adhesion, toughness and film-hardness.

Other exhibits will comprise Pentalyn 856, an alcohol-soluble high acid value rosin ester, for use in the production of flexographic and water-dispersed inks, and Cellolyn 21 (dihydroabietyl phthalate), a pale coloured balsamic resin, providing the tackifying and blending properties of hydroabietyl alcohol in a neutral and colour-stable form.

Uses for this resin include lacquers for untreated aluminium foil, heat sealing lacquers, inks for polythene, and Saran and Mylar-coated Cellophane.

Cellolyn 21 is said to show excellent compatibility with polythene and it is possible that this resin will afford a means of introducing polythene into various inks. (*Stand 55*).

Applications of the cyclic ketone resin, Resin M.S.2, will again be featured by **Howards of Ilford Ltd.,** Ilford, Essex, and this year some results of research work on its constitution and structure will be shown. A number of associated resins, derivatives, copolymers and ketone-formaldehyde resins will also be shown.

Various new esters of tetramethylol cyclohexanol and their polyoxyethylene derivatives have been prepared and found to have applications as emulsifying agents. A new anti-foam agent, Sorbester P. 117, which is of special interest in emulsion manufacture, paper and glue making processes, will also be shown.

Applications of methyl ethyl ketoxime as an anti-skinning agent, in particular in thixotropic alkyds, will be demonstrated.

A new addition to Howards' range of solvents, 'Additive A' (4-hydroxymethyl-2:2-dimethyl-1:3-dioxolane), is said to possess unsually high solvent power for a wide range of substances. Miscible with almost all commonly employed solvents, it is claimed to have exceptionally good non-foaming, wetting and dispersing power for organic pigments and lakes, inorganic pigments, earth colours, carbon blacks and metallic powders.

Plasticiser BS and Plasticiser TS are two new additions to the range. The former is a liquid plasticiser for surface coatings and has special applications in vinyl polymer emulsion formulations. Plasticiser TS is a solid plasticiser with a wide range of compatabilities. (*Stand 61*).

Hygrotherm heat transfer systems will be described and illustrated, by means of flow diagrams and typical heating and cooling curves, by **Hygrotherm Engineering Ltd.,** 5 Fitzhardinge Street, Portman Square, London W1. Photographs of recent installations will be displayed together with samples and data of the liquids used in these installations.

Hygrotherm heat generators using as fuel, oil, gas or electricity are an essential feature of a Hygrotherm liquid heat system and during the year larger sizes have been developed to meet the needs of industry. Illustrations of these units will be available on the stand where details can be discussed.

Hygrotherm heat transfer liquids are available for temperatures between minus 100°F and plus 650°F. The company states that there are no serious fire hazards or corrosion problems, no need to trace liquid pipes and tanks and no carbon deposit on heat transfer surfaces. Units available between 500,000 B.Th.U./hr. up to four million B.Th.U./hr. and over—gas, oil or electrically heated. (*Stand 80*).

A new range of pigments has become available to British industry following the recent appointment of **Johnson, Matthey and Co. Ltd.,** 73/83 Hatton Gardens, London EC1, as sole agent in the UK for the marketing of mercadium pigments, produced exclusively by Imperial Paper and Color Corporation, New York, US.

Six colours, from orange to maroon, make up the range, and it is claimed that these pigments, in which mercury replaces selenium, are not only comparable with cadmium sulphoselenides in stability but offer considerable economies in use.

Results of tests carried out on mercadium pigments for resistance to heat, light and chemical attack will be presented. In each case a comparison will be made with the effect of the same conditions on the nearest equivalent, cadmium sulphoselenide. (*Stand 58*).

Monsanto Chemicals Ltd., Monsanto House, 10-18 Victoria Street, London SW1, will feature Lytron 680, a new copolymer emulsion for the formulation of paints with excellent weathering properties.

Also to be shown is a range of products including HB 40, a non-toxic plasticiser; Lytron 820, a protective colloid, emulsifying agent and pigment dispersing agent; and sodium benzoate, a corrosion inhibitor.

Two raw materials for the paint, varnish and lacquer industries, phthalic anhydride and maleic anhydride, will be displayed. Other Monsanto products on which information will be available are Aroclors (chlorinated diphenyls), Lustrex Latices, Lytron 887, phenol, Santocels, Santolites, Santicisers and styrene monomer. (*Stand 30*).

OCCA EXHIBITION

A 50-gallon stainless steel polymerisation reactor will be the main exhibit of **Metal Propellers Ltd.,** 74 Purley Way, Croydon, Surrey. This is a hemispherical bottomed steam jacketed vessel with a variable speed motor and turbo stirrer. Photographs of the company's recent resin plant manufactures will also be displayed.

For the first time this year the company will also be showing examples of several types of distillation trays which have many applications in the oil and varnish field for the production of fatty acids, tall oils, glycerine, and formaldehyde.

The company's new Thermagrid tubular distillation tray, which is suitable for absorption, stripping and heat sensitive distillation processes, should be of interest to many manufacturers of varnish media. (*Stand 48*).

National Coal Board, Hobart House, Grosvenor Place, London SW1, will display an apparatus designed to show the production of pure products from crude benzole through intermediate stages.

In stage one, crude benzole is liberated from the benzolised wash oil and treated in various ways to eliminate the wash oil and carbon bi-sulphide.

In stage two the crude benzole is washed with sulphuric acid and distilled, the fractions taken off being intermediate fractions, such as 90's benzole, 90's toluole, some xylole, naphtha and a little still residues.

In stage three the 90's benzole, 90's toluole and xylole are each treated separately for further purification. In each case they are washed as before in order to decrease the sulphur content and the re-washed product is again fractionated. By careful control of the rate of heating, amount of re-flux etc., pure products are condensed, and after separation from water, stored for delivery. (*Stand 73*).

Exhibits by **Novadel Ltd.,** St. Ann's Crescent, Wandsworth, London SW18, will comprise new products and further developments of existing products of interest to the paint and allied industries.

Shown for the first time will be a range of Siccatolate driers, which are said to be an improvement on the existing naphthenate and octoate driers as regards drying efficiency, are practically odourless, very light coloured, and of uniform quality.

Developments in organic peroxides and their applications as polymerisation catalysts will also be demonstrated. The company's research on stabilisers for vinyl compounds will be illustrated by Estabex 2307, an epoxy stabiliser/plasticiser, and a wide range of lead compounds.

Anti-skinning agents of the oxime type are being developed and the advantages of the company's Isol R and Isol K will be demonstrated. Dehydrated castor oil and its fatty acid are specialities of the company and its latest developments will be shown. (*Stand 74*).

Recent work in the research laboratories of **Plastanol Ltd.,** Crabtree Manorway, Belvedere, Kent, has been directed towards the development of a range of styrenated alkyd resins. Three such resins, Plastyrols S.10X, S.20X and S. 30X will be shown.

The Plastyrol resins, which are modified with linoleic rich oils, styrene and alpha-methyl styrene, differ in styrene content, Plastyrol S. 10X having the lowest and Plastyrol S. 30X the highest. An increase in the styrene content results in increased hardness, water and chemical resistance with attendant decrease in drying time, flexibility, solvent resistance and compatibility with other film forming materials. Some of these effects will be demonstrated.

In addition to the Plastyrol resins, three new alkyd resins, Plastokyds 210X, 430W and 720W will be shown.

Plastokyd 210X is a short oil, non-drying alkyd modified with hydrogenated castor oil. This resin is designed for use in stoving finishes where good colour and colour retention are of major importance.

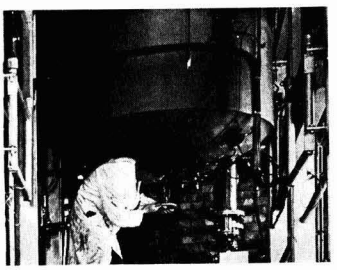
Plastokyd 430W is a medium oil length alkyd modified with semi-drying oils. This resin has been formulated for use in semi-gloss and flat finishes.

Plastokyd 720W is a long oil, low viscosity alkyd which has outstanding brushing characteristics combined with adequate wet-edge time. (*Stand 45*).

Premier Colloid Mills Ltd., Hersham Trading Estate, Walton-on-Thames, Surrey, will exhibit, for the first time, its six inch high speed paint mill. This has been developed from the three inch machine, which was shown last year, and is intended for full scale production.

It is hoped that the three inch mill will be operating and that it will be possible to make paint on the stand. A range of liquid mixing equipment will also be displayed (*Stand 36*).

Isopad Ltd., now manufacturing their electric surface heaters at their new factory at Barnet By-Pass, Boreham Wood, Herts, will show several new developments.



Isomantle on 500 gallon resin plant suitable for flameproof areas

Electric heating mantles for resin plant are manufactured for all sizes up to 2,000 gal. capacity. A pilot resin plant will be shown incorporating an Isomantle suitable for flameproof areas on a five gal. kettle. This heating method is claimed to provide efficient, automatically controlled heating to 350°C.

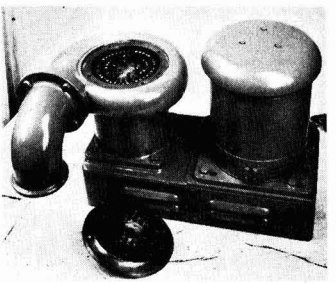
Another exhibit will be a 10 gal. vessel provided with combined mains frequency induction and resistance heating.

The range of Isotapes—flexible electric heating tapes, for heating of pipe lines—has been considerably increased and new types for frost protection and for use in flameproof areas will be displayed.

Isopanels are used for the heating of storage tanks and, lately, also for road tankers. A model of a road tanker heated by Isopanels and equipped with Diesel generators (for heating on the journey) will be shown.

For the laboratory, the Multisize Isomantle (one mantle for several flask sizes) is now made with an anodised finish. Exhibits will include units containing Multisize Isomantles with energy regulator control and temperature indication. (*Stand 78*).

Particle size reduction is the specialist field of **Kek Ltd.,** Palmerston Street, Ancoats, Manchester 12, manufacturer of pin disc mills for pigment producers. Latest addition to this range of pulverisers, the Minikek, will be shown for the first time.



Minikek grinding mill

Specifically designed for laboratory and pilot plant use in testing small batches of new products, the Minikek is compact, easy to clean and dustless in operation. Fineness of the grind can be adjusted by changing the pin discs. In common with all Kek pin disc mills, the Minikek incorporates no screens and is vibrationless when running.

Although primarily intended for batch work, the Minikek may also be used as a production machine and a continuous rating motor is fitted for this purpose. When sterile conditions must be maintained all contact parts are fabricated in stainless steel and are highly polished.

Other features of the mill include its efficiency as a blender of colours—no streaks are claimed to be visible in the resultant product—and the absence of heat while operating. The latter is of particular importance when low melting point materials are to be pulverised. (*Stand 13*).

Exhibits of **Premier Oil and Cake Mills Ltd.,** Stoneferry, Hull, will be raw materials of the paint industry, comprising vegetable oils and the seeds from which these oils are expressed, expelled or extracted. A short film will illustrate some of these activities.

Degummed soya bean oil will be on show. This is an improvement on normal crude soya bean oil and has a free fatty acid content of about one per cent. In contrast there is a sample of very high quality soya bean oil which has

OCCA EXHIBITION

been produced by deodorising alkali-refined, bleached oil. Pale in colour, it has a free fatty acid content of about 0.05 per cent. (*Stand 19*).

A wide range of split and distilled fatty acids produced from both acid and crude oils will be displayed by **Price's (Bromborough) Ltd.,** Bromborough Pool, New Ferry, Nr. Birkenhead. Among this range will be a variety of drying, semi-drying and non-drying fatty acids specially designed for the manufacture of air drying and stoving alkyds.

The company states that the split materials are produced by the latest techniques involving high pressure autoclaves, and the distilled materials are produced to the finest colour standards.

Oleines and stearines produced on the Emersol plant by solvent separation will also be featured. Fatty alcohols and textile oils, several of which have recently been improved in quality, will also be shown. (*Stand 64*).

A variety of research tools and methods will be displayed by **The Research Association of British Paint, Colour and Varnish Manufacturers,** Paint Research Station, Waldegrave Road, Teddington, Middlesex. The theme is modern methods in the service of research on the materials and processes of the related industries with particular attention to gas/liquid chromatography. (*Stand 47*).

Research Equipment (London) Ltd., 64 Wellington Road, Hampton Hill, Middlesex, will be exhibiting a complete range of equipment for DEF, BSS, AID, and ASTM specifications, together with a new abrasion machine for the testing of six panels simultaneously. These tests can be conducted with a number of different abrasion heads, including a nylon filled brush for tests on emulsion paints. Tests may be carried out either wet or dry and the load on the wear heads is adjustable. (*Stand 40*).

Recent progress in technique in the use of Epikote resins in surface coating applications will be featured on the stand of **Shell Chemical Co. Ltd.,** Norman House, 105/109 Strand, London WC2. Results obtained from various projects undertaken since the opening of the new Shell Chemical Technical Service Laboratories at Egham will be shown. These will include:

(1) Development of equipment for an examination of gas checking; (2) lower stoving temperatures for the Epikote 1007/UF system; (3) anti-skimming agents for Epikote resin esters; (4) primers for aluminium and Zintec. (*Stand 23*).

The Scalacrome range of pigments produced by **J. W. and T. A. Smith Ltd.,** Maryland Road, Stratford, London E15, has now been extended by the addition of three shades of Orachrome, the palest approximating BSS 557 and the deepest BSS 591.

These orange pigments are expected to replace conventional orange chrome. They are said to have, dependent upon shade, up to four times the staining power of orange chrome and up to two and a half times the obliterating power.

The fastness to light is claimed to be at least equal to that of orange chrome both in full shade and tint, bleed in all organic solvents is nil, oil absorption approximately 17 to 18, stoving temperature 250°F for half an hour, and printing quality superior to that of orange chrome of similar shade. (*Stand 32*).

The properties of Spelthorne metallic lead pigment will be illustrated by **Spelthorne Metals Ltd.,** 38 Berkeley Square, London W1. Exhibits will show the effect of submitting different types of metallic lead primers to certain corrosive conditions and of weathering both steel and partly galvanised steelplates which have been painted with a common topcoat and single coat of metallic lead and other primers. The steel panels have been exposed in an industrial atmosphere for over five years. (*Stand 7*).

Steele and Cowlishaw Ltd., Cooper Street, Hanley, Stoke-on-Trent, will be showing a range of machinery including the high speed ball mill (Marks I and II), the Kady kinetic dispersion mill, and the Kady laboratory mill. (*Stand 27*).

Styrene Co-polymers Ltd. announce that they hope to exhibit two new developments. Other exhibits will include information on Scopol range of styrenated alkyds, the Scopon range of epoxy esters, and the range of Scopolux pure oil modified alkyds. (*Stand 21*).

Automation to the paint industry is the theme of the exhibit by **Torrance and Sons Ltd.,** Bitton, nr. Bristol. Plant incorporating this principle is already in operation and patents are pending.

Small scale plant on the batch principle is provided to enable the laboratory to determine time cycles to guide the production plant controller in setting the timed interlocks on the automatic plant. (*Stand 9*).

Universal Oil Co. Ltd., Stoneferry, Hull, will show a short film of the Universal works and the modern plant and equipment employed in producing its range of oleines, stearines, fatty acids and glycerine.

Samples of these products will also be displayed with special emphasis given to distilled fatty acids for the synthetic resin trade such as distilled linseed oil fatty acids, distilled linseed acid oil fatty acids, and distilled sunflower fatty acids. (*Stand 19*).

Developments in the technique of mixing, dispersing and dissolving with the new Ultramix high speed portable mixing machine is the theme of **Vickers-Armstrongs (Engineers) Ltd.,** Vickers House, Broadway, Westminster, London SW1.

Samples taken from production batches covering a wide range of products including cold cut varnishes, undercoats, gloss paints and bitumens, will be available for inspection with details of the materials, methods employed, size of machines used, batch sizes, time taken and power requirements. New models of the Ultramix will also be displayed for inspection. (*Stand 22*).

Recent investigations in the company's research and technical service laboratories will be featured by **Vinyl Products Ltd.,** Carshalton, Surrey.

In view of the current controversy whether to base emulsion paints on traditional post-plasticised polyvinyl acetate or on internally plasticised vinyl acetate copolymers, the company will feature copolymers as raw materials in the production of emulsion paints.

The firm's detailed research into comonomers has resulted in the final selection of vinyl esters of fatty acids and, in particular, vinyl caprate. The display will show that there are optimum vinyl caprate contents for varying pigment/binder ratios and that these may be obtained by direct copolymerisation or by blending copolymers with a homopolymer based on the same protective colloid system, both emulsions having similar properties.

In a second section the results of investigations into the relative merits of copolymer and homopolymer based paints will be shown, and retention of film flexibility, exterior durability and loss of colour on storage will be discussed. (*Stand 25*).

Victor Wolff Ltd., Victoria Works, Croft Street, Clayton, Manchester 11, will exhibit samples of its various fatty acids, particularly those used in the manufacture of alkyd and epoxide resins. These will include white distilled linseed oil fatty acids (iodine value minimum 180), pale distilled linseed acid oil fatty acids, white distilled soya bean oil fatty acids, and Dedico, a white distilled dehydrated castor oil fatty acid, free from hydroxy acids and rich in re-active conjugated double bonds.

Also on show will be the company's dimeric acids, the large scale production of which is to be started in the near future. So far this product has been available only from abroad but it has been used for some time as a raw material in the manufacture of polyesters and polyamides. (*Stand 49*).

Further developments illustrating the wide range of processes in which the company is conducting research will be presented by **Younghusband, Barnes and Co. Ltd.,** Lower King and Queen and Upper Globe Wharves, Rotherhithe, London SE16.

In the field of polyethers prepared from epoxy resins and hydroxylated oil derivatives such as partial glycerol esters, those derived from non-drying oils are useful for their plasticising properties. They are typified by a sample of a polyether derived from coconut oil.

In view of the recent interest in water dispersible media incorporating polythene glycol attention will be re-drawn to emulsifiable stand oils which have been exhibited in previous OCCA exhibitions. Their self emulsifying properties arise from the incorporation of polythene glycol into drying oils.

Samples will be shown of cyclopentadienated oils and also of water soluble linseed and tobaccoseed oils showing the differences in yellowing. (*Stand 28*).

The emphasis of the **Zinc Pigment Development Association,** 34 Berkeley Square, London W1, will be on use of zinc pigments in paints. (*Stand 42*).

Plastics Institute Revises Appointments Register

THE PLASTICS INSTITUTE has announced that the procedure for conducting its appointments register has been revised; the position now is as follows:

Members of the Institute wishing to have their name placed on the Register, have to complete a confidential registration form obtainable from the secretary to council, at 6 Mandeville Place, London W1. This will entitle the member to have particulars of his situation wanted announced under a box number in the next issue of *Transactions*. One entry per year is permitted to each member.

As soon as a situation vacant is notified by a company to the Institute, particulars of the vacancy will be sent on to those members who are likely to be interested. Such members must apply direct to the company and not through the Institute.

Gaskell-Marsh Works Wins ICI First-Aid Contest

In the ICI General Chemicals Division inter-works first aid competition on 27 February the premier award, the Lady Muspratt Shield, was won by the Gaskell-Marsh Works, Widnes. The final placings were: Gaskell-Marsh 64.6 per cent, Randle 62.8 per cent, Castner-Kellner 62.7 per cent, Wade 62 per cent; Hillhouse, Oldbury, Cassel, Rocksavage, Pilkington-Sullivans, Wigg, Widnes Laboratory. The awards were presented by Mr. D. H. Carter, joint managing director of the division.

Extensions to Works

R. Cruickshank Ltd., chemical manufacturers, Camden Street, Birmingham 1, are planning to extend their chemical engineering works at William Street, West Bromwich.

W. J. Fraser and Co. Ltd., chemical engineers, are having extensions to their factory erected at Harold Hill, Romford, Essex.

Metals and Alloys (Birmingham) Ltd., manufacturers of zinc oxide and centrifugal castings, have had plans drawn up to extend their factory at Forge Lane, Kingsbury Road, Minworth, Birmingham.

BOT Monopolies Report

Annual report of the Board of Trade on the Monopolies and Restrictive Practices Acts, 1948 and 1953 was published on 1 March by HM Stationery Office (price 1s 4d, by post 1s 6d). One of the subjects at present before the Monopolies Commission is that of the supply of chemical fertilisers.

Imports From East Germany

UK imports from East Germany in 1956 included chemicals to the value of £1,156,592 and crude fertilisers and crude minerals, excluding fuel, worth £132,140. This was stated in the House of Commons last week.

NO DANGER LEVEL SO FAR FROM RADIOISOTOPES IN SEWAGE

'BEHAVIOUR of radioisotopes in sewage treatment and the disposal of radioactive wastes to sewer' was discussed by Mr. Arthur W. Kenney, Radiochemical Inspector, Engineering Department, Ministry of Housing and Local Government at a meeting of the British Nuclear Energy Conference, sponsored by the Public Health Division. The general principles on which maximum permissible levels of irradiation are fixed were considered. It was found that with present usage of radioisotopes these levels are not exceeded. Contamination of drains, hazard to workers in sewers and at sewage-disposal works and the effect of radiation on sewage-purifying organisms were discussed as also the behaviour of certain radioisotopes during sewage purification, the discharge of radioactive sewage effluent to rivers, and the concentration of radioisotopes in sewage sludge.

Maximum permissible levels of radiation are stated as no more than 0.3 rad/week. The rad is a unit of energy absorption corresponding to 100 ergs/gram of tissue.

No effect on sewage-purifying organisms has been observed since the radioisotope concentration levels now occurring are $10^{-6}\mu$c/cc or less.

Behaviour of radioisotopes during sewage purification has been determined and from the evidence available Mr. Kenny states that the amount taken up on the sewage filters or on activated sludge is not sufficient to be hazardous to workers. There would, however, be a danger if there was a build up of a long-lived radioisotope such as cobalt-60.

Lowest occupational maximum permissible level for any radioisotope concentration in sewage is given as $8\times10^{-7}\mu$c/cc. i.e., that for strontium-90. Discharge of sewage effluent to rivers has to be considered because of possibilities of concentration of radioactivity in the riverbed. River silts have been shown to have a considerable capacity to remove radioisotopes.

With regard to radioactive contaminated sewage sludge and its suitability for use as fertiliser, the average concentration of activity has been estimated at about $2\times10^{-4}\mu$c./gram (dry). It is stated that there is no hazard from standing near such material or from spading it out from sludge beds. Also before use as a fertiliser, some one to six months usually elapses, during which time radioactivity decays. Level of radioactivity has been found to be less than the level of $10^{-4}\mu$c./gram.

Control of radioactive sewage discharges are under constant review by the Minister of Housing and Local Government, for the genetic effect of irradiation of the public is, of course, very important. To date radioactive waste disposal has not significantly contributed to the nation's genetic damage.

Extensive Claims Made for New US Pyrethrum Synergist

DISCOVERY of a new synergist or activator, named Sesoxane, for pyrethrum and related insecticides has been announced by the US Department of Agriculture. Pyrethrin formulations utilising the new synergist will be of interest to formulators of insecticides where a non-toxic product is essential for use on grains, fruit, and wherever food is handled.

In USDA tests at Beltsville, the new synergist, when used with pyrethrins in low pressure aerosols, gave effective knock-down and kill results for the house fly, mosquito, cockroach, and Japanese beetle. Sesoxane was discovered by Dr. Morton Beroza and reported by him as the 2-(2-ethoxyethoxy) ethyl 3,4-methylenedioxyphenyl acetal of acetaldehyde. Commercial manufacture is due to start at an early date at the fine chemicals division, Shulton Inc. in Clifton, New Jersey. The chemical name adopted by Shulton for Sesoxane is 2-(3,4-methylenedioxyphenoxy)-3,6,9-trioxaundecane.

Experience suggests that Sesoxane is easy to formulate in conventional equipment, leaves no residue on evaporation and has a low acute oral toxicity, (L D50) of 2,000 milligrams per kilogram in rats.

The discovery of Sesoxane follows more than three years' work on Sesamolin and Sesamin which together account for most of the synergistic activity of Sesame oil for pyrethrum. It was first shown that Sesamolin was about five times as synergistic as Sesamin because it contains a 3,4-methylenedioxyphenoxy group in place of one of the 3,4-methylenedioxyphenyl groups in Sesamin.

Encouraged by the discovery of this structural difference which causes such a marked change in activity, Dr. Beroza prepared a large number of methylenedioxyphenoxy compounds as candidate synergists. Many of these showed synergism with pyrethrum and allethrin, but Sesoxane was superior to all the other compounds tested. Unlike most of the synergists employed today which contain the methylenedioxyphenyl group, Sesoxane is the only one to contain a methylenedioxyphenoxy group.

Obituary

MR. RONALD WILLIAM BLOOMER, chairman and managing director of Widnes Soap Co. Ltd., Farnworth, who died a few days ago, founded that company in 1933 after Gossage's closed their Widnes factory. During the last war he was a member of the Council of the Soapworkers and Fatsplitters Federation, of which he became chairman. In 1955 he was made a vice-president of the British Soapmakers' Association.

Remote Handling Equipment for Radioactive Materials

REMOTE handling equipment, known as the Master Slave Manipulator, was demonstrated for the first time last week by Savage and Parsons Ltd. at their Watford, Herts, factory. This equipment was designed and developed by the company at the request of the UK Atomic Energy Research Establishment, Harwell.

Complex and very delicate experiments and operations on highly radioactive and toxic materials can be remotely controlled by means of this equipment from a safe area situated behind protective walls and screens several feet thick.

Consisting basically of a left hand and right hand set of mechanical hand controls the manipulators are mounted in a safe area outside the concrete cell where radioactive materials and equipment are situated. The two mechanical 'hands' which are stated to reproduce all human hand movements, are situated inside the cell.

500 Moving Parts

Each 'hand' is composed of over 500 moving parts, and is made mainly of light alloy and stainless steel. Equipment such as test tubes can be picked up and prescribed amounts of contents can be transferred to other vessels. The 'hands' can be used to weigh objects on chemical balances and even a complete set of experiments can be performed by remote control. Results of manipulations are observed through a special glass window.

Cost of a Standard Savage and Parsons Manipulator is about £1,280 per hand, which is £500 less than a comparable US model.

It is understood that most of the UK atomic establishments will be supplied with the manipulator this year. Several Commonwealth and Continental countries have also shown great interest in the equipment.

In order to facilitate the use of this Master Slave Manipulator in large hot cells and to provide a detailed close-up view of an experiment, the UK Atomic Energy Authority asked Marconi's Wireless Telegraph Co. Ltd., to develop three dimensional television equipment for experimental purposes in nuclear research investigations. The operator of the manipulator can thus use a three-dimensional picture on a 14-inch screen of the monitor to supplement the view through the observation window.

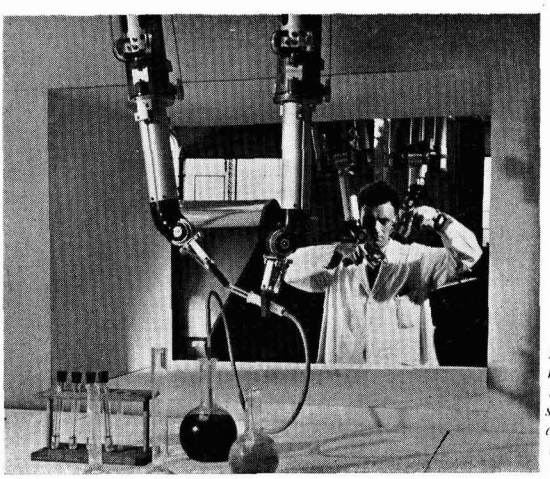
Limitation Overcome

Marconi's three-dimensional television system overcomes the limitation of the absence of perspective which occurs when ordinary two dimensional closed circuit television is used. The equipment consists of two industrial Vidicon cameras, two control units and two display monitors or viewing elements. Mounted side by side inside the 'hot' cell, the cameras are aligned so that their view of the scene of the experiment resembles that which the eyes of the human operator would see.

By superimposing the views obtained by the left-eye camera and the right-eye camera on top of the other by means of a semi-silvered mirror and a polarised light optical system, the three-dimensional effect is obtained. The view is obtained on a single television viewing screen by an operator wearing suitably polarised spectacles. Similar 3-D television equipment is also being developed for other types of remote control viewing. In some instances, the equipment will be suitable for use at distances half a mile on.

Costs of the cameras, double control equipment and double monitor with 14-inch screen is approximately £2,500.

Marconi's and Savage and Parsons have signed an agreement to co-operate in the supply of 3-D television equipment and Master Slave Manipulators to atomic energy establishments throughout the world.



Master slave manipulators being tested in the demonstration 'hot cave' at the Watford factory of Savage and Parsons

'BISOL' Chemical Prices Increased

OWING TO the substantial rise in the cost of ethyl alcohol, British Industrial Solvents have found it necessary to increase, with effect from 1 March 1957, prices of 'BISOL' products based on this material. The following are the main increases, applicable to all sizes of orders:

	Per Ton
Acetic acid, 90/100%, BP and AR grades ...	£7
Acetic acid, 80% pure and 80% technical ...	£6
Acetic anhydride	£4
Acetates—	
Methyl acetate	£9
Ethyl acetate	£10
Isopropyl acetate	£7
Butyl acetate	£8
Amyl acetate, BSS technical and confectionery grades	£5
Acetoacetarylamides—	
Acetoacetanilide	£12
Acetoacet-o-chloranilide	£12
Acetoacet-o-toluidide	£12
Miscellaneous chemicals—	
Acetaldehyde 100% and 40% (100% basis)	£13
Acetins—Monoacetin	£5
Diacetin	£7
Triacetin	£9
Aldol	£20
Diethyl oxalate	£11
Dimethyl acetal	£8
Paraldehyde	£13

Larger allowances will be made to customers taking tanker deliveries of acetic acid, acetic anhydride and acetates, thus partly offsetting these increases.

Higher Prices for Borax and Boric Acid

WITH THE exception of Boraxo hand cleanser and Ureabor weed-killer, prices of borax and boric acid will be increased from 1 April, state Borax Consolidated Ltd., Borax House, Carlisle Place, London SW1. On 22 August and 28 December last year, the company indicated their intention of holding prices firm until 31 March 1957, despite heavy cost increases. Prices cannot now be held firm beyond 31 March because of "successive increases in costs of all sorts, culminating now in a further serious increase in ocean freights."

Borax Consolidated point out that borax powder and boric acid powder are now scheduled in paper bags as an alternative to hessian sacks, with a price saving of £1 a ton. During March, orders for reasonable quantities will be delivered at current prices with first call on supplies going to contract buyers.

New prices (in hessian sacks, net per ton) are: *Borax*, ($Na_2B_4O_7.10H_2O$), granular £45; crystal £47 10s; powder £48 10s; extra fine powder £49 10s. *Boric acid* (H_3BO_3), granular £74 10s; crystal £82 10s; powder £80; extra fine powder £82; small flake £99. *Neobor* ($Na_2B_4O_7.5H_2O$), pentahydrate borax £55 10s. *Dehybor* ($Na_2B_4O_7$), anhydrous or dehydrated borax £66.

Will

SIR EDWARD OTHO GLOVER, former delegate director of the General Chemical Group, ICI Ltd., formerly for 30 years with Castner Kellner Alkali Co. Ltd., and a former chairman of Cheshire County Council, who died on 21 November last, £17,974 net.

Eliminating Dust in Chemical Plant

By Rolt Hammond, A.C.G.I., A.M.I.C.E.

EFFICIENT REMOVAL of dust from air and flue gases is a matter of great importance to the chemical industry, and many interesting techniques have been developed.

Standard equipment comprises a collector, an exhaust fan, ventilating hoods, ducting and piping to carry the collected material to a place of disposal. Dust control in many different types of chemical plant has been influenced by a system based on these standard items; a typical example is a large equipment consisting of several collectors with fans, ventilating hoods, ducting and a common return effluent system, with central recirculating and settling tanks and recirculating pump. Such a system can be adapted to meet special requirements. In the US the Schneible multi-wash system for cleaning dust-laden gases and fumes has been widely used for many years. It is now available in Great Britain from W. C. Holmes and Co. Ltd., Huddersfield.

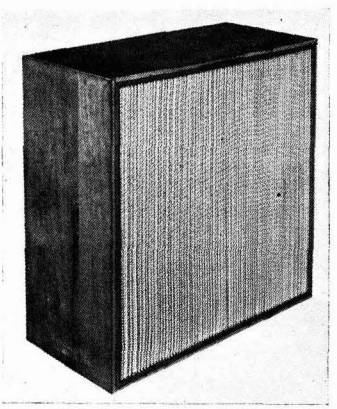
Multi-Wash Collector

A standard multi-wash dust collector, known as type HC, is employed where maximum possible efficiency of dust extraction is essential and where a large proportion of the dust is within the submicron size range. It comprises a cylindrical tower fabricated from sheet steel, either plain rolled steel or sheet steel coated with a protective covering, depending upon the nature of the dust and fumes to be collected, and upon the liquid used as the washing medium. There are six and a half impingement stages within the tower, each in the form of a horizontal disc from which curved vanes are suspended; each impingement stage rests upon a shelf. An entrainment separator, of similar construction to the vaned impingement stage, is placed above the foregoing units, forming a seventh tier. The tower terminates in a conical base.

Air laden with dust, odour or fumes enters the collector tangentially just above the cone and below the lowest, or vaneless, impingement plate. A spiral motion is thereby induced and is maintained by the curved vanes encountered by the rising air at each impingement stage. The cone shaped base acts as a wet cyclone, collecting the heavier particles as soon as they enter the tower.

Water is generally the washing agent. It enters at atmospheric pressure above the centre of the top impingement plate, moving downwards against upward flow of a rapidly whirling air current. Rotary motion of rising air sets up similar motion in the falling water which is cascaded evenly over the discs, vanes, shelves and walls of the collector. This violent whirling action forces the liquid off the edges of each disc and shelf. A water curtain thus combines with spray and impingement to envelop the dust particles rising with the air, carrying them down into the cone and out of the collector.

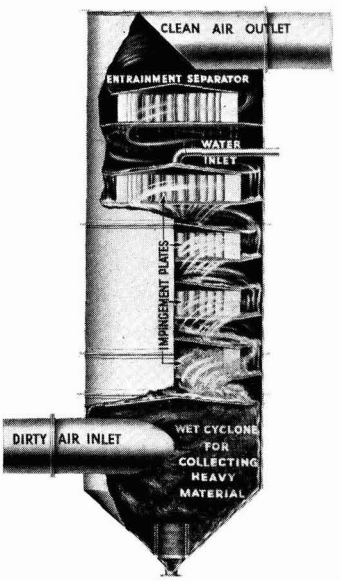
Clean air, now thoroughly washed by the scrubbing action, due to passage under and over six sets of shelves and discs and between the vanes of the impingement plates, passes through the entrainment separator located above the water inlet at the top of the tower. Removal of dust and fumes as wet sludge will eliminate secondary dust nuisance often caused by disposal of dry dust from certain types of collectors. If maximum efficiency of collection is not required, or when most of the dust is above the sub-micron size range, collectors with fewer stages are employed. These are type IC with 4½ impingement stages and one entrainment stage, and type JC with 2½ impingement and one



Vokes 55 paper panel absolute filter. Penetration is not more than 0.05 per cent, tested against a methylene blue cloud

entrainment stage. All types of collector are made, their capacities ranging from 1,000 to 40,000 cu. ft. of air per minute.

Perhaps the function of this apparatus of most interest to the chemical industry is the recovery of product through application of multiple action. Effectiveness on both soluble and insoluble dust is about the same. Fumes are removed by impingement against the closely spaced stationary vanes and flushed surfaces of the shell, deflectors and shell plates. This system can be safely used where any danger of explosion exists, due either to the inflammable nature of the liquid or solid particulate matter which has to be collected, or where the carrier gas itself is inflammable, which may apply to some phases of chemical manufacture. Intimate contact between gas and water permits



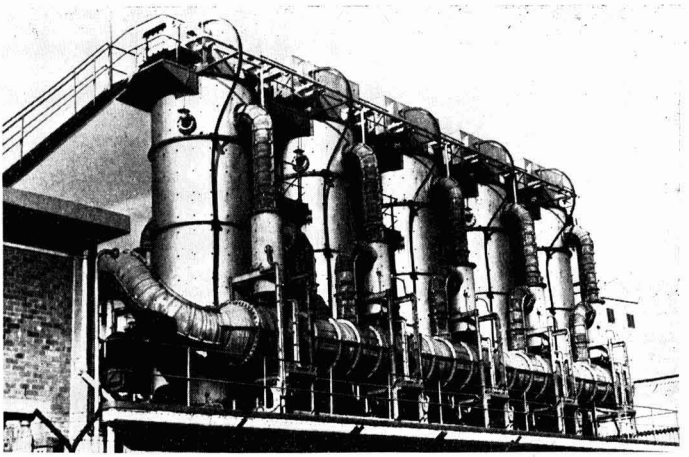
Holmes-Schneible multi-wash system, type IC collector

this system to be applied effectively to many gas cooling problems and many materials generally gaseous at high inlet temperature can be condensed into liquid droplets and collected. Soluble gases may also be recovered.

Many successful installations employ chemical reaction with the recirculated liquid for removal of a gaseous contaminant from an air stream. Hydrogen sulphide, sulphur dioxide, hydrochloric or hydrofluoric acid vapours, will react readily with an alkaline solution. Some of the more complex odours can either be removed or stabilised by means of an oxidising chemical in the recirculated liquid.

Extra vanes may be added to several stages, thus increasing impingement area and thereby achieving higher efficiencies in handling dust and fumes in which the particles are in the sub-micron range. Where volume of air or gas is variable, bleeder inlets operated either by barometric pressure or manually can be provided in the collector to ensure constant volume of air and higher collector efficiency. Where the inlet gas is at a very high temperature, admission of cooling air is sometimes desirable. Where very heavy dust load is involved or where the temperature is high, extra water inlets can be used to provide flash evaporation and cooling in the lower chamber of the collector.

Recirculating, settling and dewatering plant is associated with these collectors for continuously settling entrained solids and then draining the water from the sludge by gravity. When materials in the system have an economic value, they may be recovered by the above apparatus and drained if necessary. A special type of hood provides a curtain of fresh air around the dust. This allows removal of contaminated air from the process without excessive heat loss from the



Precipitators handling acid mist on contact sulphuric acid plant. By courtesy Simon-Carves Ltd.

building, prevents draughts and provides hygienic working conditions.

In pharmaceutical, bacteriological and similar work, the problem of dust filtration is accentuated, because particles ranging from 0.1 to 5 microns in size may give rise to difficulties in manufacture comparable with that arising from the use of coarser material. A filter of high efficiency for such work has been developed by Vokes Ltd. This embodies fine asbestos fibres dispersed in a matrix of relatively coarse cellulose fibres, made from esparto grass. By careful control of manufacture, a composite paper was developed which gives an exceptionally high efficiency of dust retention, but at the same time offers only very low resistance to air flow.

Since the paper is thin. a very large area of filtration can be accommodated in a small space; a filter panel two feet by two feet by 11½ inches deep is rated at a flow of 1,000 cubic feet per minute of air with initial resistance to flow of less than one and a half inches water gauge. A shallower panel two feet by two feet by five and seven-eighths inches deep has even better characteristics, rated at 500 cubic feet per minute at one inch water gauge.

Filter Element

An efficiency of 99.95 per cent has been attained with this filter, and efficiency rises steadily with accumulation of dust on the paper. The filter element itself is a specially developed esparto grass-based paper containing a proportion of finally carded long asbestos fibres. The paper panel is cemented into a wooden frame with resinous adhesive which ensures freedom from leakage at the critical edge area. Each individual cell is provided with a uni-cellular sponge rubber sealing pad which locates against window flanges in the main assembly framework. This system permits easy removal of contaminated panels without direct handling, an essential requirement where any radioactive dust is concerned.

The reverse-jet filter is an excellent equipment for removing dust and certain fumes from air and other gases. The Mikro-Fil filter, Fig. 1, is of this type and is manufactured in Great Britain under licence from Pulverizing Machinery Company of Summit, New Jersey; it provides an efficiency of 99.9 per cent or even higher on a weight basis, with some exceptions. It embodies a dense filter medium which increases the efficiency of filtration independent of the bridging of interstices such as exist in woven fabrics. It is claimed to have a high filtering velocity per unit area of fabric. Porosity of the filter and constancy of pressure drop are maintained through a slot-formed jet through which air at high velocity is injected through the filter medium in reverse direction to filtration flow. The jet moves progressively over the filter medium with the slotted ring, fed with compressed air from a blower of positive displacement type, or by a high pressure centrifugal fan.

This filter has proved to be very efficient for vaporised silica of 0.6 micron

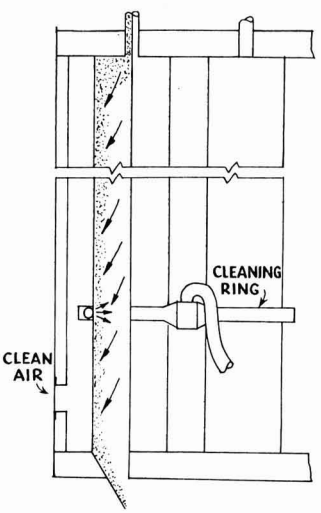


Fig. 1. Reverse jet filter

size; since half this dust is smaller than 0.6 micron, the filter is therefore efficient in the sub-micron range. Dust loading on filters in service range from that of atmospheric air up to an atmosphere in which there are several hundred grains per cubic foot. Where moist gases are being filtered, they must be kept above the dewpoint, but infrequent wetting of the filter medium—as from condensation when starting up from cold—does not appear to be harmful unless the collected gas is soluble or tends to form a mass resembling cement. It may sometimes be an advantage to warm the reverse-jet air and thereby avoid local condensation.

Limitations of this apparatus at present are set by the usable filter media rather than by the basic method. Dense wool felt is generally the chosen material, but it is limited to a temperature of between 190 and 200° F and to only mild acid or alkaline conditions. Woven fabrics are generally unsuitable, depending upon the formation of a filter cake for efficiency. and the reverse-jet destroys this cake by opening the holes in the weave. In an assembly of tubes 12 feet long, only 0.5 per cent of the filtering area is out of service at any time by the porosity maintaining action, and there is no need for temporary shut-down of a section being cleaned, with consequent loss of control by prevailing pressure.

Electro-precipitation

Electro-precipitation is a process very widely used for dust removal from flue gases. This process is highly efficient and considerable economy of running cost is achieved owing to low power consumption and draught loss, very low maintenance cost, and exceptionally long service life. It is not possible to give even a general idea about capital cost of electro-precipitation, because the size of the plant will depend not only upon the volume of the gas to be handled but also upon the class of material to be collected and the desired efficiency of collection. A small plant will be proportionately more costly than a large one, because even a small plant must have high-tension electrical equipment.

There are two main types of electro-precipitators. Fig. 2 shows the diagrammatic arrangement of a single-stage precipitator. The tubular type, in which the receiving electrode is a tube, may be of either cylindrical, hexagonal or square form. In this type the gas flow is always vertically upward. In the plate-type precipitator, the receiving electrodes are plates, sometimes of special design for efficient collection of dust. Gas flow may be either vertical or horizontal.

Plate-type precipitators may be further subdivided into single-stage and two-stage equipments. In the former case, the discharge electrodes extend over the whole length of the gas passages, and the particles are charged and precipitated within the same treatment chamber. The two-stage precipitator. on the other hand is provided with a short preliminary ionisation section in which particles receive their charge. Collection takes place in a static capacitor field in a separate section; this type is used

mainly for removing dust from atmospheric air. The single-stage precipitator is the one most widely used for industrial applications.

An electro-precipitator causes electrically charged particles to be transported in an electric field. Although particles in a gas stream often have a natural charge, this is generally so small that it can be ignored. For electro-precipitation it is necessary to have free ions, and these are generated when a corona discharge is set up in an electric field of high intensity.

When a wire of small diameter is charged to high potential, an intense electric field is created. An electron in this field will be so highly accelerated that when it strikes a molecule it will set free another electron; these two electrons will be further accelerated, striking other molecules and freeing more electrons, with consequent eruption of ions. The belt of corona discharge will be visible as a bluish glow around the electrode wire. Discharge electrodes are normally at negative potential, because experience proves that negative corona discharge is more stable than positive and applied voltage can be held at a higher value. In a two-stage precipitator, a positive corona is used for air cleaning in order to minimise generation of ozone.

Charged particles, when they have traversed the space between discharge and receiving electrodes, will make contact with the receiving electrodes, where they give up their charge quickly or slowly according to their resistance and to the resistance of the layer of particles already deposited. They are held to the electrodes by molecular adhesion forces.

Firm Adhesion

As soon as a particle of dust has been deposited on an electrode, it must adhere so firmly that it will neither be eroded nor blown off by the gas stream; a great difficulty arises when a layer of dust grows to such a thickness that it must be removed artificially so that the efficiency of the precipitator will not suffer. This problem can be surmounted by allowing the dust to accumulate into lumps large enough to fall through the gas stream without being re-dispersed; or the dust can be guided into a collecting hopper so that the gas stream will have no opportunity of re-entraining dust.

It is of interest to note that many patents have been taken out for inventions which get the precipitated dust as soon as possible into a quiescent zone so that it can fall into the reception hopper undisturbed by the gas stream. Special types of receiving electrode for this purpose began to be developed about thirty years ago, when the problem arose of cleaning flue gases from lignite-fired boilers, the solution to which was found by R. F. Heinrich with his 'high-duty' electrode. This consists of a hollow box with slots pressed into the walls. the dust being driven through the slots and allowed to fall into the hopper down the inside of the box.

The high-tension electrical equipment must be capable of providing a voltage adequate to set up a corona discharge

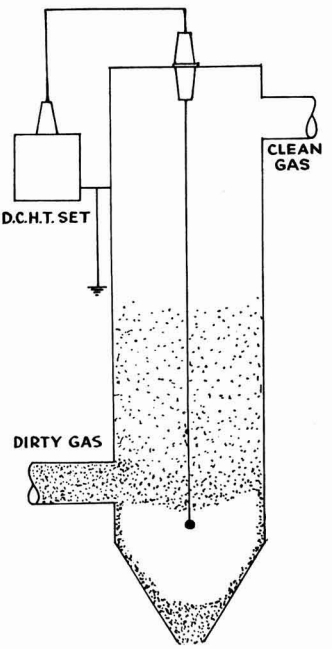


Fig. 2. Single-stage precipitator

with whatever type of electrode design and spacing is adopted, usually values ranging from 30 kV to 75 kV or even higher. On Simon-Carves precipitators, for example, the standard equipment gives outputs of 33, 45, 50, 60 and 75 kV with current from 30 to 350 mA, but larger sets are available for special duties.

A transformer-rectifier unit provides direct current by conversion of alternating current. The Simon-Carves-Ferranti static metal-oxide rectifier is noteworthy in that it has no moving parts, and the first equipment of this type was installed in 1929. By 1944, a totally enclosed shock-proof rectifier had been introduced, which dispenses with the elaborate screening of high-tension connections required in older types. The static rectifier has many important advantages, among which are the following: output wave is smooth enough for optimum voltage to be maintained in a stable condition. The alternating current cycle is rectified and used without high-frequency effect on the wave-form, as in the case of mechanical rectifiers. Maximum high-tension voltage is available under full load, without reduction by low-tension stabilising and current-limiting resistances. A rectifier can be remotely controlled with ease, because it needs no visual setting or correction for varying gas conditions.

Typical examples of electro-precipitation in the chemical industry include removal of dust and fumes from pyrites roasters; sulphur trioxide and sulphuric acid mist from cold roaster gases; sulphuric acid mist from wet catalyst sulphuric acid plants; dryers and calciners for aluminium hydroxide; and dryers for potassium and sodium salts. An equipment of special interest is a high temperature precipitator used in acid works for the cleaning of burner gases; this apparatus is of Sturtevant manufacture.

Greater Powers Sought on Handling of Dangerous Substances

A PROPOSAL that fire authorities should be given increased powers of control over the way in which dangerous substances are stored or handled has been put to the Home Office by the County Councils Association. The association is also suggesting that the terms of reference of the Working Party on Petroleum Spirit should be expanded.

This would be to enable them to investigate the necessity of legislation 'in regard to the storage and handling of inflammable liquids and substances generally.'

This approach followed a report from Worcester Fire Brigade Committte on the problem of controlling industrialists and others who in developing their sites or altering their storage or other arrangements created new fire risks.

The association has in mind particularly the storage or highly inflammable liquids such as methynol which were outside the scope of the Explosives Act, 1875, or the Petroleum (Consolidation) Act, 1928

Redundant Rumour Denied

Mr. F. Smith, manager of the Widnes Employment Exchange, denies rumours that several Widnes firms in the chemical and allied trades have declared a number of workers redundant.

Extension Plan Widens Range of Palfsacks

FIRST STAGE of an ambitious development plan has been completed at their Rochester works by William Palfrey Ltd., 24 City Road, London EC2, makers of Palfsacks multi-wall paper sacks. The plan includes the provision of additional space and new buildings, improved layout for production purposes and the installation of new machinery.

Equipment already added makes possible the production of new types of Palfsacks in a new range of shapes and sizes. Some of the new sacks being made include special lines for gums and adhesives, dyestuffs, chrome tar powder, cornflour and hydrated lime.

Chemical Duty of Resilon

Russell Constructions Ltd., Russell House, Adam Street, London WC2, inform us that the chemical duty of Resilon, which they are now marketing on behalf of Mendip Chemical Engineering Ltd., is generally between pH2 and pH12.

Furnace for Insulation Fibre

A new furnace for the production of Rocksil synthetic insulation fibre went into operation at the Stirling, Perthshire, works of Asbestos Co. recently. The furnace took six weeks to dry and to reach the extremely high temperatures necessary.

CORROSION PROBLEMS IN CHEMICAL FACTORIES—4

Plant Floors and Foundations

By

F. R. Himsworth, Ph.D., B.Sc.,

and

J. G. Hines, Ph.D., M.A.

ONLY acid plant floors are considered here, and not the many types of floors that can be used under relatively non-corrosive conditions for comfort, appearance, cheapness etc. It is always wise to assume in the first place that, however carefully the plant is designed, and whatever confidence is placed in the managers and operatives, more or less serious spillage of acid will occur from time to time, and that, if the floor is not completely acid-proof, leakage will occur, with consequent damage to whatever is beneath the floor. This may be foundations beneath a ground floor, or other plant beneath an elevated floor. In either case the damage may be very expensive, and out of all proportion to the cost of laying a resistant floor. It is usually unwise to take a risk, which may entail re-laying the floor in better materials later on, since permanent and expensive damage may occur before this can be done.

Plant Floors: Floors may be either continuous (e.g. concrete, latex cement, rubber) or composed of small units such as ceramic bricks or tiles, rubber or plastics tiles etc. A continuous floor has evident advantages, since it is free from joints, which are a source of weakness. Unfortunately, however, there is no continuous flooring material which is at the same time free from a tendency to crack, resistant to traffic, and resistant to acids. Thus neither type of floor gives complete assurance of a long life free from leaks.

Uncrackable Material

The best solution is to use a combination of a continuous, uncrackable material which is resistant to chemical attack but not to traffic, and a brick or tile floor which is resistant to traffic and to chemical attack, but which cannot be guaranteed to remain free from cracks, especially if some movement occurs. Only in this way has it been found possible to guarantee freedom from leaks. The continuous member is a sheet of flexible, chemically-resistant material, laid without joints; suitable materials include polythene, polyisobutene (p.i.b.), certain asphalts, an acid-resisting cement of sufficient flexibility etc. Of these we have found polythene to be the most reliable; its chemical resistance is adequate for any likely form of attack; it is flexible and readily stretches by the small amounts called for, and it can be welded into a 'jointless' floor.

A minor disadvantage is that the cement used in bedding the tiles does not adhere to the polythene, but this difficulty is overcome by using fairly thick tiles, preferably bricks, three inches thick, well bonded together, so that they remain in position by virtue of their weight.

If the floor is laid to a fall, as all acid plant floors should be, it may be necessary to prevent movement of the floor, say by cross members over the duct at the low side. The best thickness of polythene is about one-sixteenth inch; this is sufficiently robust not to need special care in laying. Thinner material such as 0.010 inch foil can be used, but is easily punctured, and great care is required in using it. P.i.b. is used in the same way, but is much more flexible and is available in continuous rolls, whereas polythene is supplied as sheets, say 10 inches by five inches. It is easier to fit p.i.b. into angles and corners. P.i.b. is readily attacked by organic solvents, and should not be used if these may reach the floor. It is not made in the UK but can be imported from Germany.

Asphalt is much less satisfactory as an interlayer; to prevent cracking it should be well reinforced with hessian, and applied in several layers. Even so it is liable to crack, especially after chemical attack. Its chemical resistance is of a much lower order than that of polythene. With the elaborate measures necessary to minimise the risk of cracking it is little, if any, cheaper than polythene or p.i.b. Renderings of acid-resisting cement are not completely reliable; they have not sufficient resilience to withstand movement of the floor without cracking.

Wearing Surface

The wearing surface should be of good quality acid-resisting bricks or tiles, set in a cement which will resist attack by *all* chemicals likely to come into contact with the floor—this includes alkalis which may be used to neutralise spillages. Such cements have been described in the literature, and will not be discussed here. Important points are that the bricks should be uniform in dimensions, and laid with thin joints, and that every joint should be full of cement—this calls for careful supervision. The aim should be to make the tile floor as perfect as possible; the interlayer is there in case of failure of the tiled surface by cracking or chemical attack, but it should be regarded as a reserve only, in case of emergency.

Foundations: Foundations, like drains, are buried as soon as they are made, and not subject to regular inspection. Damage may, therefore, go on for years before it is detected. Repairs of serious damage may be quite impossible and the only solution may be to re-build a whole plant. It is clearly wise to take all reasonable precautions to prevent such damage, and the importance of not allowing corrosive liquors to reach foundations has been mentioned in connection with floors.

It is not generally realised how much contamination of ground water may occur because of permeable floors and broken drains; concentrations of several per cent of salts, and even acids, are not unknown. The effect of such contamination depends to a large extent on the nature of the soil. If it is impermeable clay, the liquors cannot penetrate quickly; thus fresh material reaches the foundations only very slowly, and attack is slow. If the soil is sandy, transfer of liquor is much more rapid, and attack more serious. It may also occur at a considerable distance from the point of leakage.

Once the ground has become contaminated there is not much that can be done. If the soil is permeable it may be possible, by making pits and pumping continually, to remove the contaminating materials gradually, provided the source of leakage is stopped. But the adage 'Prevention is better than cure' applies with particular force to the question of attack on foundations.

It is worth while taking some care over the mixing and laying of concrete in foundations, since the rate of corrosion of poor concrete is many times greater than that of well compacted dense concrete. Ability to withstand the load of the building should not be the only criterion in designing concrete for chemical plant foundations; high quality concrete is most desirable. It is also wise to make the foundation a foot or two larger than is necessary; this 'corrosion allowance' of dense concrete will take many years to destroy, unless the ground water is strongly acidic. The use of sulphate-resistant Portland, or super-sulphated cement, may give some extra protection, especially if the contaminant is a sulphate or sulphuric acid.

An effective safeguard is to surround the foundation with an impervious layer, say of p.i.b., or a bituminised fabric, which will prevent the access of liquors to the concrete. This solution is, however, a somewhat expensive one. It is often used if foundations are to be laid in ground which is already contaminated.

Before a new foundation is placed in ground which may be contaminated, soil analyses should be carried out. It is not usually necessary to go deeper than about 10 feet, but this depends on the permeability of the soil, the ground water level, etc. Fresh concrete is very susceptible to attack, and in contaminated soil an appreciable thickness may fail to develop reasonable strength.

Law of Restrictive Practices

Restrictive Trade Practices and Monopolies, by Wilberforce, Campbell and Elles, published by Sweet and Maxwell at 84s, is claimed to be the definitive work on the subject. As well as giving the background to the new legislation and examining the Act of 1956 it suggests the practical steps to be taken by industry and trade associations when the Act comes into force.

Full appendices are included and the work will be kept up to date by a supplementary service.

Overseas News

MITSUI OF JAPAN ACQUIRE PROCESSES FOR TEREPHTHALIC ACID AND DMT

MITSUI Petrochemical Industries Ltd. has acquired a licence in Japan on unique liquid-phase, air-oxidation processes for the production of terephthalic acid, dimethyl terephthalate and other aromatic intermediates from petroleum-based feedstocks. The new processes will be used at Iwakuni City in Japan, where the first phase of a $30-million petrochemical project is already well under way.

The processes to be used by Mitsui were discovered and developed by Scientific Design Co. Inc., New York City, and associated companies. Standard Oil of Indiana have also done considerable research and development work on these processes and have recently acquired the entire rights to the processes. Scientific Design will serve as licensing agent for the processes outside of the US.

Standard Oil have announced plans to build a $10 million plant using the unique oxidation processes in the US and have commissioned SD to design the plant. Pechiney in France, which had obtained a licence for the processes prior to their acquisition by Standard of Indiana, are also planning to install a plant.

The large new Mitsui project is being financed entirely with Japanese funds from eight firms: Koa Oil Co. Ltd., Miike Synthetic Industry Co. Ltd., Mitsui Bank Ltd., Mitsui Chemical Industry Co. Ltd., Mitsui Mining Co. Ltd., Mitsui Mining and Smelting Co. Ltd., Toyo Koatsu Industries Inc., Toyo Rayon Co. Ltd.

A large part of the production of the new petrochemical development at Iwakuni City will be used in synthetic textile fibres. First phase of the Mitsui project now under construction will include ethylene oxide, ethylene glycol and cumene. These plant units were designed and engineered by Scientific Design Company and will utilise processes developed by SD.

Mitsui will send a team of chemists and engineers to the US to discuss adaptation of the aromatic oxidation processes to meet special Japanese requirements. The Japanese team will visit the SD research laboratories and pilot plant at Manorhaven, Long Island, where the processes were discovered and developed, as well as the Standard research laboratories.

Hydrogen Fusion at Low Temperatures

According to Dr. Kurt Driebner, speaking in Hamburg on 2 March, German atom scientists have discovered how to effect hydrogen fusion at low temperatures, a process which is similar to the fusion process on the sun.

Until now the method of effective fusion without an atom bomb trigger has been kept a closely guarded secret by the US and USSR.

The German scientists are not able to say when fusion at low temperatures would be feasible on an industrial basis.

Israel Carbide Plant Planned

Locally discovered deposits of lime at Petah Tikva, Israel, will be used for the production of carbide at a new factory to be set up in the area. Production is scheduled to begin before the end of this year. Output is to be of the order of 4,000 tons a year, of which 1,000 tons will be exported and the remainder will meet local demands.

The sum of IL one million is to be invested, two-thirds by local investors and the rest from Swiss and UK investors.

Chilean Nitrate Industry Labour Losses

New industries established in Northern Chile are reported to have taken some 1,500 workers from the nitrate industry Some 18,000 workers are at present employed in the industry.

Sulphuric Acid Plant for Chile

Braden Copper Company, Chile have been authorised by the Chilean Government to import new capital totalling US $3.1 million for a new sulphuric acid plant having a capacity of 75 tons a day and for four condensing tanks of reinforced concrete. Of this sum US $1.4 million is to be spent in Chilean currency and US $1.7 million on imported equipment.

Research by Du Pont

Details of work being carried out at the new $2 million industrial products research laboratory of E. I. du Pont Nemours at Newport, Delaware, US have recently been revealed. Products being studied include man-made fibres in tyre cord, plastics reinforcement, non-woven fabrics, felts, protective coatings.

Chemicals for Milan International Fair

The thirty-fifth Milan International Fair will be held from 12 to 27 April. Some 13,000 exhibitors will be present, one-third coming from over 50 different countries. A main group at the fair is devoted to industrial and agricultural chemicals, pharmaceutical products, medical requisites, and machinery and plant for chemical and pharmaceutical industries. In another section, plant for extraction, refining and use of crude oils and natural gases will be shown.

Corrosion-resistant Separator

An impingement type corrosion-resistant separator for the removal of liquid particles from air and other gases has been developed by National Carbon Co., Division of Union Carbide and Carbon Corporation. This separator is made of karbate impervious graphite, is a compact self-contained unit ready for inserting in a pipe line. Rods of impervious graphite, streamlined in cross-section, are staggered in rows within the cylinder.

Although minimum clearance is .25 of an inch which prevents clogging, a beam of light will not pass through. As the gas to be scrubbed flows through the cylinder, moisture particles impinge on the separator rods and the gas flows on through.

Indian Control of Industries

The Industries (Development and Regulation) Act, 1951, came into force on the 8th May, 1952. This Act which brought 42 industries under the control of the Union Government enables the Government to secure the development of those industries in conformity with it industrial policy. The Industries (Development and Regulation) Amendment Act, 1956, which has now been passed by the Indian Parliament and has received the President's assent, will come into force on a date to be appointed by the Government of India. This Act adds 31 new industries to the existing schedule of 42 industries already under the control of the Union Government. The First Schedule (i.e. the list of industries to which the Act applies) has been re-arranged so that the industries are grouped together on a scientific basis.

Industries affected by the two Acts include industrial machinery, e.g. chemical machinery and equipment required for various 'unit processes,' such as mixers and reactors, filtration equipment, centrifugal machines, evaporators and distillation equipment; industrial instruments; scientific instruments; fertilisers; chemicals (other than fertilisers); dyestuffs; drugs and pharmaceuticals; and fermentation industries, i.e. alcohol and other products of fermentation industries. Under some of these headings are included also intermediates required in manufacture of the final product.

German Chemical Industry Developments

A new intermediate product Chloropren, for use in plastics manufacture is reported to have been developed by Knapsack-Griesheim, AG. of Cologne. According to press reports, Chloropren will be polymerised at Bayers' plant at Leverkusen.

It is also reported that annual capacity for yellow phosphorus is to be increased to 35,000 by Knapsack. This, it is stated, will enable the company to meet all German requirements and, should later on, allow an export surplus for sale to neighbouring countries.

The three successor companies to pre-war I. G. Farben industrie, Badische Anilin—und Soda Fabrik (BASF) Ludwigshafen, Farbenfabriken Bayer, Leverkusen and Farbwerk Hoechst, Frankfurt-am-Main have jointly established a company, Synthesekautschuk-Beteiligungsgeselleschaft m.b.h. with a capital of DM 60,000. This company is to look after the interests of the three companies of the synthetic rubber manufacturing company Bunawerk Hüls, G.m.b.H.

Radioactive Lamp's 12 Years' Life

A radioactive lamp which will shine for 12 years before it needs refuelling has been developed by the industrial laboratory of the Denner and Rio Grande Western Railway, US. The light is filled with radioactive gas trapped in a partial vacuum between coated lenses that can be tinted to the various colours needed for railway signals.

Australian Quotas for Chemical Imports Increased

As stated briefly in 'Overseas News' of 23 February, Australia is to issue special import licences to allow increases of up to 100 per cent on certain chemicals imported during the current quarter. Chemicals affected by this decision are: preparations being formaldehyde or containing formaldehyde; sulphur chloride, carbon tetrachloride; calcium chloride, barium chloride etc.; chlorate of potash, carbonate of potash.

Expansion at Hamburg Refinery

Wholly owned subsidiary of British Petroleum Company, the German BP, is reported to be launching a £2.1 million (DM.25 million) 8 per cent debenture issue at 98 per cent to finance its current £4.2 million expansion programme. The main expansion scheme planned is an increase in the capacity of the Hamburg refinery by 0.5 million tons to two million tons a year. A hydrofiner will also be constructed, and a plant for production of raw materials for synthetic rubber.

Diamond Hard Compound Produced by GEC

General Electric Company, US reported some time ago that they had produced 'man-made' diamonds. The company hoped to produce larger synthetic diamonds at a price competitive with the natural industrial stones. Development has continued, but no commercial production has yet been begun. Now General Electric announce that their research has led to the production of a new substance, 'borazon.' It is claimed that this may be 'of equal, probably greater' importance to industry than man-made diamonds.

Borazon is described as a compound of boron and nitrogen made under pressures of 1 million lb. per square inch, and temperatures of 3,000°F. It is said to be as hard as diamond and to withstand a much greater heat. The material as now known appears to be nearest to crushing boart, widely used as an abrasive which sells at 18s. 3d. a carat.

It is suggested by General Electric that borazon could be used whenever industrial diamonds are used as an abrasive. Its superior heat resistance is thought to allow better methods of mounting stones in industrial tools, while buts and wheels could be run at higher speeds.

Pilot production of borazon has not yet started, but the company hopes to produce the compound at a competitive price. There is a large market for industrial diamonds and last year the Central Selling Organisation's sales were worth £24 million. The US would, of course, be pleased to be independent of outside supplies of industrial diamonds.

Plastics Markets in Hong Kong

A report on the market for plastics raw materials in Hong Kong has been prepared by the UK Trade Commissioner in Hong Kong, and is available from Export Services Branch, Lacon House, Theobalds Road, London WC1.

Figures are given for the quantities of plastics raw materials imported into Hong Kong in 1955 together with quantities exported. The vast majority of the articles fabricated are exported but comprehensive statistics of these exports are not available.

The plastics-ware industry is said to be one of the major industries of Hong Kong and its products are believed to be among the most competitive in the world.

IMPORTS AND EXPORTS OF PLASTICS MATERIALS: HONG KONG 1955.

	Quantity in lb. Imports	Exports
Acrylic resins including polymethyl methacrylate ...	445,448	2,484
Polystyrene and polydichlorostyrene	7,029,471	830,594
Cellulose acetate and acetate butyrate	248,976	55,041
Formaldehyde resins including phenolformaldehyde, urea formaldehyde and melamine-formaldehyde	1,585,802	126,569
Plasticised nitrate cellulose	460,514	61,875
Vinyl resins including p.v.c., p.v.a. and acetals ...	558,155	350
Film scrap	68,258	—
Synthetic plastics materials, n.e.s.	1,741,238	113,875
Leather cloth	771,982	51,556

India Modifies Tariff on Certain Chemicals

The Indian Government has exempted the following articles from import duty in excess of the rates indicated and from all additional duty: acetanilide sulphonyl chloride; aminothiazole; aminodiazine (standard rate 30 per cent, preferential 20 per cent); aminopyridine; acetyl acetone (standard rate 26⅔ per cent, preferential 16⅔ per cent).

Powder alcohol has been exempted from Excise duty provided it is intended for use in the production of ethylene and ethylene based products and not as fuel for internal combustion engines.

Union Carbide Enter Fluorocarbon Field

Entry into the fluorocarbon field is announced by Carbide and Carbon Chemicals Co., a division of Union Carbide and Carbon Corporation of the US, who have plans to build a 50 million lb. a year plant unit. Expected to be on stream by the latter half of 1958, the unit will be sited at the company's Institute, West Virginia plant. With this new unit, total US capacity will exceed 300 million lb. a year.

Production and sale of fluorocarbons is the company's first commercial step into the field of fluorine chemistry. Its research teams are now working to provide new fluorine chemicals. In the field of polymer chemistry, the Bakelite Co., another Union Carbide division, has developed several fluorethene resins.

Organic chemical products containing fluorine are exceptionally resistant to high temperatures and corrosive attack. Since the war a large demand has grown for fluorocarbons in refrigeration, air-conditioning and aerosol packages.

Power-Gas and NSW Petrochemical Plant

The Silverwater, New South Wales, petrochemical plant (see 'Overseas News', 2 February) was engineered and supplied by the Power Gas Corporation Ltd., Stockton-on-Tees. The Didier-Kogag tar dehydration equipment referred to was the only plant purchased by Power-Gas in Germany.

The company's Australian subsidiary at Carlton, Victoria, received the order for the supply and erection of a Semet-Solvay oil gas plant for Petroleum and Chemical Corporation (Australia) Ltd. at Silverwater in February 1954. Starting with a residual oil, the plant produces benzole, toluene and xylene and light and heavy tar. The oil cracking plant produces gas of high calorific value with a high percentage of ethylene and propylene.

German Plastics Congress at Bad Pyrmont

West German plastics industry is holding its 1957 congress on 10 and 11 April at Bad Pyrmont. Sponsoring the congress with the associations' of the plastics industry are the committee for high polymer physics of the Association of German Physical Societies, plastics and rubber group of the German Chemical Society, the plastics committee of the German Standards Institution and the plastics technology group of the Association of German Engineers.

The mornings will be devoted to papers of general interest while in the afternoons, papers will be read in no less than three parallel groups.

Themes to be discussed on the morning of 10 April will be 'General and economic significance of nuclear energy' and 'Automation in plastics processing'. In the

afternoon Group 1 will discuss physics, chemistry and testing of plastics; Group 2 compression and injection moulding; Group 3 extrusion. On the morning of 11 April the themes discussed will be 'Petrochemicals and the plastics industry' and 'Modifying the properties of plastics by radiation'. In the afternoon Group 4 will discuss new techniques in plastics processing: Group 5 will report on the technology of manufacturing shaped components; Group 6 will discuss bonding and welding and fluidised coating of plastics.

Morning papers will be presented by leaders in the scientific and industrial fields while the afternoon discussions will be under the chairmanship of acknowledged German specialists.

Further information may be obtained from Organisations-Komittee der Kunststoff-Tagung 1957, Frankfurt/Main, Karlstr. 21, or, from April onwards, from the Kunststofftagungbüro, Konzerthaus, Bad Pyrmont.

Research Reactor for Union Carbide

A nuclear research centre is to be built in Sterling Forest, New York, by Union Carbide and Carbon Corporation. Facilities will include a five megawatt pool-type reactor, a radioactive materials laboratory, an ores and engineering laboratory and a building for allied research operations and administrative functions. Research programmes will be geared to the study of the effects of radiation on products and processes involving plastics, gases, metals, carbons and chemicals. The reactor is a modified version of the bulk shield testing facility pioneered by Oak Ridge National Laboratory.

Jamaican Bauxite and Alumina

Some 1,954,480 tons of bauxite valued at £3,437,600, were produced in Jamaica between January and September 1956. Practically all was shipped to the US. During the same period, some 132,350 tons of alumina—valued at over £3,600,000—were produced, and most went to Canada. Just over 13,000 tons went to Norway and 2,750 tons to Sweden.

Alumina Jamaica Ltd. are reported to be making progress with their new plant near Ewarton, St. Catherine.

Chemical Developments in Spain

A detergents factory is to be installed in Madrid by Compania Iberica de Detergentes SA with foreign collaboration. Production will be of the order of 6,000 tons per year. Of the 100 million pesetas capital, 54 million pesetas will be for imported machinery and raw materials.

Authorisation has been granted to Coromina Industrial, Barcelona, to build a new plant at Reus (near Barcelona) for the manufacture of liquid carbon dioxide. Capacity of the plant will be 200 kg. per hour.

It is understood that a plant for the production of 100,000 tons of ammonium sulphate may shortly be erected at Zaragoza at a cost of about 270 million pesetas.

An extension to the Axpe-Erandio (Vizcaya) factory is planned by Union Quimica del Norte de Espana SA for the production of from 20 to 50 tons daily of methanol. It is estimated that the extensions will cost 17 million pesetas, of which some 7.5 million pesetas will be for imported machinery including a gas cooler, a contact chamber and heat exchanger, and various pumps and compressors.

La Socieded Polialcohol SA, a new company, is to set up a factory to produce fatty alcohols by catalytic hydrogenation at Prat de Llobregat, Barcelona. Capital is 20 million pesetas, and machinery worth 5 million pesetas is to be imported.

Ammonia and Urea Plant for Ontario

Establishment of a multi-million dollar chemical plant at Hamilton, Ontario, has been announced by North American Cyanamid, a subsidiary of American Cyanamid. Associated with this project are Dominion Foundries and Steel, of Hamilton. It is expected that construction of the plant will be completed by the middle of 1958. Initial annual capacity will be 52,500 tons anhydrous ammonia and 66,000 tons urea.

Swiss Chemical Exports Rise

Switzerland's exports of chemical products rose in 1956, although not the extent of the rise of total Swiss exports. It is reported that dyestuffs exports were 10 per cent below the 1955 level in the first half of 1956, but the loss was more than made good in the second half of the year. About three-fifths of total Swiss dyestuffs exports went to European markets, that is, slightly more than in 1955. Exports to Asia and China in particular fell. For the first eleven months of the year pharmaceutical exports were 11 per cent higher than in the same period in 1955, India, Persia and Siam being the main markets.

FOR YOUR DIARY

MONDAY 11 MARCH

RIC, CS & SCI—Leeds: Chemistry Lecture Theatre, University, 6.30 p.m. RIC Lecture: 'Automatic Control and the Chemist' by the Earl of Halsbury.

SCI (Chemical Engineering Group)—London: 14 Belgrave Square SW1, 5.30 p.m. 'Survey of Industrial Filtration' by A. P. Hosking and K. C. Salter.

CS—Belfast: Queen's University, 7.45 p.m. 'Reduction by Metal-Ammonia Solutions' by Professor A. J. Birch.

CS—Oxford: Physical Chemistry Laboratory, University, 8.15 p.m. 'Some Topics in Chemotherapeutics' by Dr. F. L. Rose.

Institute of Metals (Scottish Section)—Glasgow: Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, 6.30 p.m. 'Production and Uses of Rare Metals' by Dr. J. C. Chaston. Followed by annual meeting.

TUESDAY 12 MARCH

RIC—Hatfield: Technical College, Roe Green, 7.30 p.m. 'Soil Chemistry and Plant Nutrition' by K. Shaw.

RIC—Rochdale: Municipal Technical College, Nelson Street, 7.15 p.m. 'Chemical Aspects of Dyeing and Finishing Man-made Fibres' by F. V. Davies.

WEDNESDAY 13 MARCH

RIC—London: Iron and Steel Institute, 4 Grosvenor Gardens SW1, 6.30 p.m. 'Zone Purification and its Application to Silicon' by N. Parr.

SCI—London: 14 Belgrave Square SW1, 6.30 p.m. Joint meeting of Food and Microbiology Groups. 'The Production of Sterilised Milk' by Dr. L. F. L. Clegg.

SCI (Oils & Fats Group)—Liverpool: Nicholson Theatre, Department of Organic Chemistry, University, 7 p.m. 'Lipids and the Problem of Atherosclerosis—a Survey' by Professor R. A. Morton.

SAC (Scottish Section)—Edinburgh: George Hotel, George Street, 7 p.m. 'Some Aspects of the Estimation of Uronic Acid in Carbohydrate Materials' by Dr. D. M. W. Anderson; 'Routine Semi-Micro Determination of Molecular Weights' by J. Brooks and A. F. Williams.

THURSDAY 14 MARCH

Royal Society—London: Burlington House W1, 11 a.m. Discussion: 'The Cytoplasm in Variation and Development'.

I.Chem.E.—Manchester: Reynolds Hall, College of Technology, 7 p.m. 'Disposal of Long-Lived Fission Products' by J. R. Grover.

CS—London: Royal Institution, Albemarle Street W1, 7.30 p.m. 'Chemical Problems Relating to the Origin of the Earth' by Professor H. C. Urey.

CS—Gloucester: Technical College, Brunswick Road, 7 p.m. 'Use of Radioisotopes in Industry and Medicine' by Dr. G. B. Cook.

CS—Liverpool: Chemistry Lecture Theatre, University, 5 p.m. 'Chemistry of Vitamin B_{12}' by Professor A. W. Johnson.

FRIDAY 15 MARCH

CS—Glasgow: Chemistry Department, University, 7.15 p.m. 'Chemistry of Actinomycin' by Professor A. W. Johnson.

CS—Newcastle upon Tyne: Chemistry Building, King's College, 4 p.m. Meeting for reading original papers.

SAC—Swansea: Chemistry Lecture Theatre, University College, 6.30 p.m. 'Some Recent Developments in Metallurgical Analysis' by G. W. C. Milner.

Bradford Chemical Society—Bradford: Technical College, 7 p.m. 'Some Chemical Aspects of Vegetable Tanning Materials and of the Parent Poly-phenols to which the Tannins are Related' by Dr. D. E. Hathway.

SATURDAY 16 MARCH

SAC—Liverpool: City Laboratories, Mount Pleasant, 2.15 p.m. 'Recent Work in the Study of the Composition of Air Pollution' by Dr. E. T. Wilkins.

Despite Higher Output, Nickel Supplies Remain Scarce

New Sources Must be Exploited

ALTHOUGH there is a heavy demand for practically all industrial metals at present, it is reasonable to assume that some would be in surplus were it not for the US stockpiling programme. Nickel would undoubtedly be an exception owing to the fact that as US stockpiling is a strategic practice, nickel is not being kept in balance by the US authorities to stabilise the market, but is in genuine shortage. And, although considerable quantities of nickel have been diverted from the US stockpile to industry, these diversions have done little to satisfy demand. Diversions from the stockpile in 1956 totalled 79,300,000 lb. compared with 23,950,000 lb. in 1955.

It is a reasonable assumption that the quantity diverted from the stockpile in 1956 accounted for a large part of nickel originally intended for it. Distribution of the free world nickel supplies in 1956 was similar to that of 1955 with about 65 per cent going to the US and 35 per cent to the UK, Canada, and other countries.

Steady Increase

Production of nickel has steadily increased over the past few years but the supply has not satisfied demand, although production in 1956 was a record of 450 million lb., surpassing the record output in 1955 of 427 million lb. It is evident that there is a gradual decrease in the rate of increase of production, and this is due to the near completion of the expansion programme started owing to the Korean war which has raised overall output by 65 per cent. This slowing down in the rate of increase in production can be seen by comparing figures—this year the percentage increase is in the region of 3.5 per cent; in 1955 it was 10.3 per cent, and in 1954, 29 per cent. The rise in the world output is mainly due to Canadian developments, which resulted in the production of 81 per cent of the world's nickel output in 1955.

The only means of solving the nickel shortage problem will be the exploitation of new sources of the element, and in this respect an announcement of vital interest to nickel users was made towards the end of last year by both the Premier of Manitoba and the president of Inco. This announcement stated that the International Nickel Company of Canada Ltd. were to open two new nickel mines in the Moak and Mystery Lakes area of Northern Manitoba and that it would be the largest nickel-producing project in the world next to Inco's operations in the Sudbury distict of Ontario (CHEMICAL AGE, 1956, **76**, 444).

Capacities of certain other nickel producers should show an increase by 1960. These increase will probably be of the following order:—

	million lb.
Falconbridge Nickel Mines Ltd.	55
Sherritt Gordon Mines Ltd.	20
Other Canadian producers	15
Total Canadian production	475

Outside Canada, totals for 1960 may be:—

	million lb.
US Government project at Nicaro, Cuba	50
Hanna Nickel Smelting Co. Ltd.	17
New Caledonian ores	65
Other free world producers	18

New Caledonian ores are processed in France and Japan and the Japanese nickel has been a beneficiary from the shortage of the metal, selling in Europe at prices around £1,800-£2,300 per long ton—against the price of £600 per ton in the UK.

It can be expected from the foregoing estimates that the total free world nickel-producing capacity will be between 600 and 625 million lb., exclusive of supplies from any new project in Cuba. This represents an increase of between 175 and 200 million lb. above the total for 1955.

Future Demand

Future demand for nickel, for both civil and defence purposes, is difficult to assess, although a steady increase has been maintained. During 1956, the steel industries of the free world continued to use the largest proportion of primary nickel which went mainly into stainless and engineering alloy steels. Record output of nickel-containing stainless steels was achieved, aided considerably by substantial use of stainless scrap. Considerable demand continued for heat-resisting alloys, as nickel-chromium alloys of this type are required for application in gas-turbine engineering.

WORLD PRODUCTION OF NICKEL (excepting U.S.S.R. Sources) in Long Tons

	1950	1951	1952	1953	1954	1955
Canada (a)	110,410	123,127	125,499	128,297	143,999	156,404
New Caledonia (b)	5,226	4,137	7,380	9,294	12,511	15,803
Cuba	—	—	7,968	12,361	12,986	13,516
U.S.A. (c)	815	675	565	538	2,362	4,341
Union of South Africa	829	1,120	1,289	1,688	1,886	2,320
Others	—	709	670	554	398	447 (d)
	117,280	129,768	143,371	152,732	174,141	192,831

(a) Comprises refined nickel, nickel oxide and recoverable nickel matte.
(b) Output of smelter products in New Caledonia and Japanese production from New Caledonian ore.
(c) Comprises by-products of copper refining, and content of ore.
(d) Approximate figure.

An increase in the use of nickel in the electronics field was evident in 1956. Nickel is used in radio and television valves and permanent magnets for loudspeakers. Catalytic uses of nickel also showed an increase, with consumption about three times greater than that of five years ago.

Although rather more nickel was available for the plating industry in 1956, demand continued to exceed the supply despite the fact that in Europe, polished aluminium and stainless steel is being increasingly used to replace certain bright plated components.

Production of corrosion-resisting nickel cast irons increased during the year. These alloys are mainly used in chemical processing and petroleum industries, where nickel-copper alloy has continued to be employed, again for its resistance to corrosion.

Only time will show whether the increased output gained by exploiting new ore bodies and in technological improvements which may produce a greater yield from the ores will satisfy the increased demand for nickel.

Unilever Subsidiary Develops Cocoa Butter Substitute

A COMPLETE equivalent to cocoa butter has been announced by Loders and Nucoline, a subsidiary of Unilever. The new product, called Coberine, is described as being chemically similar, and as nearly as possible identical in all its physical properties with the natural product.

The western region of Nigeria is reported to be very concerned about this report, particularly with regard to the claim that Coberine is cheaper than the natural product. This region of Nigeria produces one-seventh of the world's supply, and its Government relys on the export duty on cocoa for a quarter of its total revenue. However, a cable from Unilever to the Lagos office of the United Africa Company, one of the Unilever group of companies, points out that other substitutes for cocoa butter have been in existence for some time and that while Coberine is an improvement on them, it lacked the natural flavour of cocoa as do all substitutes.

Electron Microscope at Steel Co.

The United Steel Companies Ltd., Sheffield, have installed a Siemens II electron microscope at their central research and development department. Magnifications of up to 100,000 times will be possible with this new equipment. Because of the impossibility of passing an electron beam through a thick metal specimen it is necessary to use a replica. Plastics replicas were originally used, but these were found to be unsatisfactory and have been replaced by carbon replicas.

Drawback of Duty on p.v.c. Film

It is understood that the Board of Trade is considering an application for drawback of import duty under Section 9 of the Finance Act, 1932, as amended, in respect of imported unplasticised polyvinyl chloride film.

Chemist's Bookshelf

POLYPEPTIDE SYNTHESIS

SYNTHETIC POLYPEPTIDES. Preparation, Structure and Properties. By *C. H. Bamford, A. Elliott,* and *W. F. Hanby.* Academic Press Inc., New York. Academic Books Ltd., London. 1956. Pp. 445. $10.

This monograph is the fifth in the physical chemistry series edited by Eric Hutchinson. As a comprehensive survey of post-war developments in the topical field of synthetic polypeptides by the distinguished Courtauld group, this book fills a unique place.

The work is broadly concerned with the presentation of detailed evidence about polypeptides in relation to the general problem of protein structure. The extensive data obtained in this field within recent years now provide a clear picture of the backbone configurations of synthetic polypeptides and the effect of these configurations on physical and other properties. In view of the fundamental structural similarity between the polypeptides and the proteins, these results are immensely valuable in interpreting the structure and behaviour of the protein molecule itself.

The first three chapters are devoted to the synthesis of polypeptides as protein models. Of these, Chapter ii is pre-eminent in providing an extensive review of methods of polypeptide synthesis which concludes with a useful experimental section. In chapter iii the mechanism of polypeptide synthesis is critically discussed in the light of the substantial experimental data obtained by Dr. Bamford and his colleagues.

Chapters iv to x compass the major theme of the work. They are concerned with the physical properties of high molecular weight synthetic peptides, and the correlation of these properties with the underlying molecular structure.

After an important survey of the problems inherent in configurational studies of polypeptides, the remainder of this section of the book brilliantly describes the application of infra-red spectroscopy and X-ray diffraction methods to the structure of alpha and beta polypeptides. The theoretical treatment throughout is outstanding.

Following a brief section on biological properties of synthetic polypeptides by S. E. Waley, the book concludes with a key chapter on fibrous proteins and their relation to synthetic polypeptides, with particular reference to the silks. This fascinating chapter, in co-ordinating the entire book, promises the eventual solution of structural problems in the more complex field of the globular proteins.

J. H. TURNBULL.

Physico-Chemical Analysis

PHYSICAL METHODS IN CHEMICAL ANALYSIS. Volume III. Edited by *W. G. Berl.* Academic Press Inc., New York. 1956. Pp. xii + 652. $15.

This latest addition to the series, *Physical Methods in Chemical Analysis,* edited by W. G. Berl will be welcomed by those fortunate chemists who possess the earlier two volumes. However, a glance at the subject-matter of this volume reveals that in contrast to the earlier two books the newcomer to the series is relatively much more up to date since it deals with several new methods of analysis which have only been developed since mid-century. Some of these new methods will not only supplement older methods but may well render some of them obsolescent.

It is the reviewer's opinion that Vol. III will have a much greater sale than either of its predecessors. The topics covered are: Gas (vapour phase) chromatography, electrochromatography (zone electrophoresis), high frequency methods, field emission microscopy, flame photometry, microwave spectroscopy, nuclear magnetic resonance, X-ray fluorescence methods, analytical distillation, neutron spectroscopy and Neutron Interaction in Chemical Analysis.

A less specialised, but nevertheless invaluable, chapter appears on electro-analytical methods in trace analysis and an equally necessary and welcome chapter on the theory and principles of sampling procedures for chemical analysis.

The inclusion of the latter section is most commendable. Far too little emphasis is placed on the necessity for accurate sampling of materials. The standard in all sections of the book is high, but in the reviewer's opinion those on gas chromatography, zone electrophoresis and high frequency methods are outstanding. Many readers may, however, feel that the first mentioned section could profitably have been expanded.

The section dealing with NMR comes most appropriately at a time when widespread interest is being developed in this new technique. The section on neutron spectroscopy and neutron interactions occupies more than one quarter of the space available in this volume. While one is aware of the very many possible applications of this technique and also its remarkable sensitivity, which far exceeds that of any other physico-chemical method, it nonetheless appears to have been treated overfully in relation to some of the other topics. It is, however, an excellent exposition, which may be comprehended by the novice without undue difficulty.

One would have thought that some of the space allotted to this section might well have been devoted to a subject such as *liquid—liquid extraction.* This would have fitted in well with the other separation techniques dealt with in this volume, *viz.,* gas chromatography, analytical distillation, electrochromatography.

At $15, the book is disappointingly expensive and most students will have to content themselves with occasional glimpses at library copies. The book at the reviewer's disposal is very poorly bound. The strength of the backing is inadequate to support the good quality heavy paper in which the book is presented.

T. S. WEST.

Analytical Instruments

MODERN INSTRUMENTS IN CHEMICAL ANALYSIS. By *F. M. Biffen* and *W. Seaman.* McGraw-Hill Book Co., London. 1956. Pp. 333. 56s 6d.

In this book the authors have presented modern instrumental techniques which are currently used in chemical analysis. As stated in the preface, the book has been written mainly for chemists in order that they may appreciate the value of present day instruments, as well as their limitations, in the solution of analytical problems.

The book consists of a short introduction covering electro-magnetic radiations and notes on sampling. There follow 13 chapters covering emission spectroscopy, flame photometry, visual and ultra-violet spectrophotometry, infra-red spectrophotometry, Raman spectroscopy, mass spectrometry, X-ray diffraction, a survey of electroanalysis, polarography, potentiometric analysis, conductometric analysis, coulometric analysis, and radioactivity.

In each section the authors outline the fundamental principles of the separate analytical methods, without making the treatment too complex. The instruments are described with the aid of good illustrations of modern American models.

This book will be found of use to any research worker who is concerned with problems of analysis, and is a useful contribution to the literature. Each chapter has a bibliography, and there is an

E.J.C.

Over 30,000 Entries

THE CONDENSED CHEMICAL DICTIONARY. Reinhold Publishing Corp., New York. Chapman and Hall Ltd., London. 5th edition. 1956. Pp. xix + 1200. 100s.

Containing over 30,000 entries, this is claimed to be 'the most complete chemical dictionary in both number and kind of entries, as well as in extent of essential information'.

This type of claim is easy to make but is very difficult to prove without an exhaustive comparison with similar publications. The reviewer, however, has found this book to be extremely useful for finding such information as chemical and physical properties of chemicals, and manufacturers of proprietary products in the US.

Thumb-indexing is provided for easy reference and easy-to-read type is used.

J.P.S.J.

MANCHESTER SYMPOSIUM ON PLASTICS IN CHEMICAL ENGINEERING

A SYMPOSIUM on modern developments in the use of plastics in the chemical industry, arranged by the Graduates' and Students' section of the North-Western Branch of the Institution of Chemical Engineers was held on 23 February at the College of Science and Technology, Manchester. Dr. J. F. C. Gartshore presided.

In a paper on plastics materials in chemical plant, Messrs. I. Burridge and C. H. Byles, considered the use of thermoplastic and thermosetting resins. Keebush, polyvinyl chloride, polythene and glass-fibre laminates based on epoxy hydrate and polyesters. Rubber derivatives were excluded. It was stated that nylon, high density polythene and butadiene, styrene and acrylonitrile will be used in the future since these materials are non-toxic and do not contaminate the manufactured product. The properties of polythene, Perspex, nylon, p.t.f.e., Keebush, and glass-fibre laminates were given, followed by illustrations of equipment made from plastic materials.

Coatings for metals were dealt with by Mr. G. H. Jenner in his paper—on the application of plastics to metals. He excluded linings for vessels. He remarked that the principal processes were powder spraying, flame spraying, dipping and dispersion spraying. In the first process the thermoplastic was sprayed on to the hot object, in the second process the object was dipped into a fluidised powder for five to ten seconds. Flame spraying was an extension of metal spraying and the object must be pre-heated to remove moisture from its surface. Dispersions were sprayed from equipment with large nozzles and pore-free coatings were obtained. P.t.f.e. was used in the solid form and would not form a pore-free film; nylon resisted oil and thiokol protected ships' propellers. Epoxy resins could be sprayed by flame.

Speaking on future trends in the application of plastics, Mr. J. M. J. Esterez said that a steel-p.v.c. laminate was now available. Higher homologues of methyl methacrylate with higher melting points and less tendency to craze were being developed. High density polythene was an improvement over polythene on environmental cracking and polypropylene would soon be available. Chloro derivatives of p.t.f.e. were considered to have a greater ease of fabrication than p.t.f.e. and to have equal chemical resistance. P.t.f.e. resisted sticky materials because it had a low coefficiency of friction, it had good lubricating properties and it was a reliable insulator. Fluorinated silicone rubber was being developed and promised to be an outstanding elastomer.

'Radiation initiated polymerisation' was the subject of Dr. R. Roberts' paper. The fuel U^{235} gave fission products of lesser atomic weights than U^{235}, which had varying half-lives with high radioactivity. Uses for the fission products were sought, particularly for Sr^{90} and for Cs^{137} which had the longest half-lives, by the initiation of chemical reactions using the β-particles from the former element and the γ-radiation from the latter. Chain and non-chain reactions developed, the former giving more chemical change per electron-volt than the latter. Radiation produced a polythene which had a very desirable polymethylene chain and there was no catalyst to be removed. Irradiated polythene had increased flow properties because it was cross-linked and radiation also decreased the flow properties of acrylic and silicone rubbers.

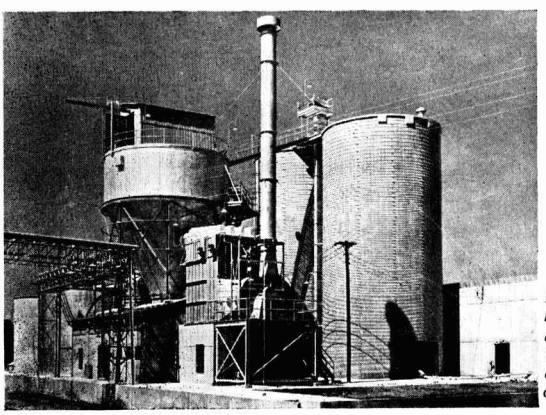
Development of Spray Drying

SPRAY DRYING techniques—once used mainly for milk powder, soap, detergents, tannins etc.—have been widened considerably and have been the subject of recent development work by Niro Atomizer AS, Copenhagen, whose UK agents are Cornwell Products Ltd., 232 Great Portland Street, London W1.

The large drier illustrated handles about 15 tons an hour of a concentrated kaolin slurry, from which nine tons of dry powder are produced under evaporation of about six tons of water an hour. A rotary atomiser was designed for this plant and upwards of 100 h.p. is transmitted from the driving motor to the vertical spindle rotating with about 12,000 r.p.m. An atomiser wheel capable of withstanding abrasion from the product was also developed.

Although the evaporative capacity of the drier is much higher than usual, the dimensions of the drying tower are said to be 'not excessive'. The cylindrical diameter is 30 ft. and the cylindrical height about 10 ft. Total height of the drier includes the 60 cone of the tower.

This plant employs a high inlet air temperature of more than 1,000° F, which has given a thermal efficiency of about 80 per cent. Such a drying temperature is too high for most products, but it should be pointed out that only the moist particles are in contact with the very hot drying air and that the high evaporation rate keeps the particles cool. Temperature of the particles rises to about 200° F only towards the end of the drying process.



Niro Atomizer feel that large spray driers of this type will find an increasing use in the chemical industry

IEA Exhibition and Conference at Olympia

TWO HUNDRED British manufacturers will exhibit the latest advances in scientific and industrial instruments at the Instruments, Electronics and Automation Exhibition at Olympia, London, from 7-17 May 1957.

The exhibition is promoted by five British trade associations: The British Electrical and Allied Manufacturers' Association; The British Industrial Measuring and Control Apparatus Manufacturers' Association; The British Lampblown Scientific Glassware Manufacturers' Association; The Drawing Office Material Manufacturers' and Dealers' Association; and The Scientific Instrument Manufacturers' Association of Great Britain.

In conjunction with the exhibition a conference will be held at which important aspects of instrumentation, electronics and automation will be discussed. Each day's proceedings will be devoted to a main theme. Leading experts will deliver the principal papers and there will be opportunities for contributions and discussions from the body of the hall.

Assurance Sought on New Glynllifon Chemical Plant

CAERNARVONSHIRE branch of the Council for the Preservation of Rural Wales is seeking an assurance that a proposed chemical factory will not harm the amenities of the Pwllheli-Caernarvon coastal strip. Ashburton Chemical Works Ltd., Trafford Park, Manchester, have acquired a 30-acre site for the factory at Glynllifon Park, near Caernarvon.

Building of the factory may begin when agreement has been reached for a water supply from a proposed reservoir about 20 miles away and when suitable facilities have been arranged for the disposal of effluent.

People in the NEWS

● MR. GEOFFREY WHITEHEAD, who has temporarily left his post with the Atomic Energy Authority at Chester, is now on his way to Australia on board the *Himalaya* to carry out special chemical engineering research with Imperial Chemical Industries (Australia) Pty., Ltd., Victoria. Mr. Whitehead, who will be away a year, is to study the problem of steel corrosion by high pressure waters. He is making the visit under a £1,000 fellowship awarded by the British Memorial Foundation. These scholarships were started five years ago by businessmen and others in the State of Victoria to enable the pick of British youth to go to Victoria to investigate problems which on their return would benefit the UK.

● MR. C. ROBERTS, regional chemical officer for the Transport and General Workers Union has been nominated chairman of the North Western Regional Board for Industry. He is a member of the heavy chemical J.I.C., serves on two national committees of ICI Ltd., dealing with wages and working conditions of chemical process operatives and is secretary of the Manchester and Salford area organisation of the Chemical and Allied Industries J.I.C. training scheme for qualified chemical operatives.

● MR. GEORGE WEST, who joined the export department of Newton Chambers and Co. Ltd. last year, has been appointed assistant export manager of the chemicals division He entered the company in 1954 as assistant to the secretary, later transferring to the chemicals division. Before joining the export department he gained experience in the home sales and the accounts departments. Mr. West graduated in 1952 from Worcester College, Oxford, with a B.A. in Jurisprudence, and last year became an M.A. He has also attended courses at the Sorbone in Paris and at Sheffield University. He is the son of Sir Harold and Lady West.

Mr. George West

● Stirlingshire and district section, Society of Chemical Industry, has appointed as its chairman LIEUT.-COLONEL F. M. POTTER, Stirling. The vice-chairman is DR. W. G. REID, and DR. S. D. FORRESTER, 15 Heugh Street, Falkirk, is hon. secretary-treasurer.

● Willows Francis Ltd. have appointed MR. J. R. DAVIS and MR. A. ROBERT BRIDGES directors of the company. Mr. J. R. Davis has been secretary of the company for three years. He acted as joint secretary from 1949 until 1954.

● DR. LARS G. SILLEN, Dean of the Chemistry Department, Royal Institute of Technology, Stockholm, has been named Arthur D. Little Visiting Professor of Chemistry at Massachusetts Institute of Technology for the current semester. During the next three months Dr. Sillen will give a series of 20 lectures on 'Studies on chemical equilibria.' In these lectures, he will deal briefly with the history of the law of mass action, develop the mathematical methods used in treating equilibrium systems containing many known reacting species, and conclude with a discussion of mathematical and experimental methods of treating equilibrium systems of unknown species.

Since 1950 Dr. Sillen has been professor of inorganic chemistry at the Royal Institute of Technology. A consultant for the Research Institute for National Defence in Sweden, he is also president of the commission on equilibrium data, analytical section, International Union of Pure and Applied Chemistry. He started research work on X-ray crystallography with Professor Arne Westgren in 1937, and several years later gradually turned to solution chemistry. In later years Dr. Sillen has been particularly concerned with working out better experimental and mathematical methods for treating complicated ionic equilibria, notably equilibria where polynuclear complexes are formed.

● MR. JOSEPH J. TEPAS has been appointed to the market development department of the industrial chemicals division, Olin Mathieson Chemical Corporation, Baltimore. He will specialise in sanitation and water treatment.

● MR. PETER H. COLE, managing director of R.H.C. Reclamations Ltd., has been appointed to the additional office of joint managing director of R. H. Cole and Co. Ltd., raw materials for plastics and surface coating industries, 2 Caxton Street, London SW1.

● MR. R. TURNER, chief engineer of Powell Duffryn Technical Services Ltd. has been appointed to the board of that company in place of MR. G. W. ALEXANDER, chief engineer of Powell Duffryn Ltd.

● MR. S. A. GREGORY, B.Sc., M.I.Chem.E., has been appointed technical manager of Audley Engineering Co. Ltd. He will be located at Newport, Shropshire and will move from Scunthorpe, Lincolnshire, where he held the post of chief of Frodingham Research Department, Appleby-Frodingham Steel Co.

● MR. J. W. DUNCAN, assistant export manager of Albright and Wilson Ltd., left London Airport recently for a nine-week visit to South America and the British West Indies, where he will be meeting the company's agents and customers.

● MR. A. M. BROWN, B.Sc., research assistant to Dr. W. R. Moore, Department of Chemistry and Dyeing, Technical College, Bradford, has been awarded a Dupont Research Fellowship at Yale University, US, for the next session. Mr. Brown is submitting his thesis for Ph.D. this summer.

Mr. A. M. Brown

● DR. GERHARD HERZOG has been appointed assistant general manager of the research and technical department of the Texas Company. Exploration and production research will in future form a division of the company's research and technical department.

Wills

MR. A. J. M. SHARPE, a director and the founder of Bioglan Laboratories Ltd., who believed he would live to be a hundred, and took out an insurance policy for £10,000 to mature at the age of 100, died aged 75, on 3 October, and left £12,100 net.

MR. CHARLES HERMAN WINDSCHUEGL, founder of Charles H. Windschuegl, chemical merchants, 1 Leadenhall Street, EC, who died on 15 December 1956, aged 90 years, left £49,231 17s 3d gross, £48,157 2s 1d net value.

Newspaper Press Directory Now Available

The 106th edition of *The Newspaper Press Directory*, which is now available, gives particulars of more than 1,350 newspapers, nearly 4,000 periodicals and about 1,000 directories and year books published in the UK and Eire. The overseas section contains details of more than 11,000 publications in the Commonwealth and other countries. Copies are obtainable from any bookseller or direct from the publishers, Benn Brothers Ltd., Bouverie House, 154 Fleet Street, London EC4, price 50s plus 3s 6d postage.

Commercial News

No Increase in Borax Production Until Completion of New Plant

Reviewing the year's activities, Mr. D. A. Smith, chairman of Borax (Holdings) Ltd., states that every borax and boric acid plant and refinery was operated to capacity. No increase in volume can therefore be anticipated until the completion of the new plant facilities, which is expected in the latter part of the current financial year. Details of the group's trading results were published in CHEMICAL AGE, 23 February, p. 346.

Boots Pure Drug Co.

Interim dividend for the half-year ending 31 March of 3 per cent has been declared on ordinary by Boots Pure Drug Co. Ltd.

Geo. Cohen 600 Group

Directors of the George Cohen 600 Group, announce plans to raise approximately £2m. by a placing of a new class of preference capital and a rights issue of ordinary shares.

General Refractories

Dividend of 17½ per cent (same) on the one-class capital increased from £1,040,000 to £1.25 million by a rights issue is announced by General Refractories. Group trading profits rose from £691,399 to £871,119, to which is added £1,359 (£1,443) trade investment income. Subsidiaries retain £15,422 (£19,868), leaving £285,157 (248,015) to be included in the parent's accounts. General reserve receives £125,000 (£120,000) and after the dividend £155,058 (£120,682) is carried forward.

Sam Kay and Co.

Mr. John Kay, who presided at the annual meeting of Sam Kay and Co. Ltd., rubber and leather manufacturers, Bury, said the company had entered into an agreement to acquire additional buildings for the adhesives and solutions departments to allow for future extensions in Latex Process and Dispersions Co. Ltd.

Redfern's Rubber Works

Net profit of Redfern's Rubber Works Ltd., Hyde, Ches, for 1956 was £4,945 (£16,551). No dividend is recommended on ordinary. £15,000 is transferred from general reserve to cover losses to date on the Australian activities.

Triplex Safety Glass Co.

Because productive capacity could not keep pace with orders, there has had to be some curtailment of sales activity on the part of Quickfit and Quartz Ltd. Steps are being taken to remedy this position by the installation of additional plant, but plant without skilled labour is of no use. This is stated in an interim report of the directors of the Triplex group of companies for the half-year ended 31 December. A school of trainee labour has been set up, but it represents a fairly large burden being carried by the company. It is not expected that the year's results will be as high as last year, but the directors state there is no cause for alarm.

Referring to the recently set up German subsidiary, QVF Glastechnik GmbH, the interim report states that despite keen competition from German manufacturers and the difficulties entailed in starting a new company from scratch in a foreign country it is expected that the venture will break even and may perhaps show a small profit in the current financial year.

The subsidiary was established early last year at Wiesbaden to manufacture glass pipeline and plant, to supplement the range imported from England by QVF Ltd.

Ekco Plastics

E. K. Cole Ltd., Southend-on-Sea, have formed a new subsidiary, Ekco Plastics Ltd. to take over the group's plastics division.

Blythe Colour Works

Group net profit of Blythe Colour Works Ltd., for 1956 was £137,847 (£165,646). Dividend of 25 per cent (same) is declared.

NEW COMPANIES

APOLLO RESEARCH ORGANISATION LTD. Capital £2,000. Research work in the field of cosmetic, photographic, domestic and chemical industries etc. Director: J. Gajsler. Registered office: 19 Bedford Row, London WC1.

CHEMICAL PROCESS DEVELOPMENTS LTD. Capital £1,000. Developers, inventors and designers of and research workers in chemical, physical, industrial and constructional processes, plant, apparatus and equipment etc. Directors: J. A. Radley, E. J. S. Beckley and N. L. Smith. Registered office: 220-222 Elgar Road, Reading.

W. A. HUMPHREY (ENGINEERS) LTD. Capital £2,000. Manufacturers of chemical and pharmaceutical equipment and foodstuff machinery etc. Directors: W. A. Humphrey, E. A. H. Humphrey, and L. F. Dowling. Registered office: 501 York Road, Wandsworth, London SW18.

METERING PUMPS LTD. Capital £2,000. Manufacturers of and dealers in measuring pumps, instruments and gauges, testing machines and other scientific instruments, plant, apparatus and materials for the measurement, treatment, purification or disposal of liquids and the utilisation of by-products, chemical engineers etc. Solicitors: Theodore Goddard and Co., 5 New Court, London WC2

SMITH AND NEPHEW PHARMACEUTICALS LTD. Capital £50,000. Manufacturers of and dealers in chemicals, gases, drugs, medicines etc. Registered office: Bessemer Road, Welwyn Garden City, Herts.

LONDON GAZETTE

Voluntary Winding-up

(A resolution for the voluntary winding up of a company does not necessarily imply liabilities. Frequently it is for purposes of internal reconstruction and notice is purely informal.)

HAWKER AND BOTWOOD LTD., agricultural and horticultural chemists, registered office: Wolsey Works, Carpenters Road, London E15. C. Reid, 1 Leadenhall Street, London EC3 appointed liquidator 20 February.

BRITISH UNION OIL CO. LTD., oil producers, By special resolution registered office, Baltic Exchange Buildings, 21 Bury Street, London EC3. R. Fawcett, 24 St. Mary Axe, London EC3, appointed liquidator, 31 January.

Market Reports

Active Export Trade in Chemicals

LONDON Home trade demand for industrial chemicals has been well maintained during the past week with contract delivery specifications covering good volumes. Export business in chemicals continues active and returns for January compare favourably with the same period in 1956.

Owing to the substantial rise in the cost of ethyl alcohol, the makers announced price increases in Bisol products based on this material, as from 1 March. The makers state that partly offsetting these increases larger allowances will be made for tanker deliveries (see page 430).

The latest price for copper sulphate is lower at £89 10s per ton less 2 per cent f.o.b. Liverpool, and as from 2 March the basis price for white lead was reduced by £1 10s a ton and red lead and litharge are both £1 15s a ton lower.

In a steady coal-tar products market pitch, naphthalene creosote oil and cresylic acid are active items.

MANCHESTER Quotations of chemical products on the Manchester market have been maintained on a generally firm basis. Price increases in acetic acid, acetic anhydride and butylacetate and a wide range of solvents range from £4 a ton upwards, in consequence of rise in cost of ethyl alcohol, and increases in borax and boric acid come into operation at 1 April. There is a steady demand for most heavy chemicals against contracts with a fair number of fresh inquiries circulating. Fairly active conditions are now reported in the fertiliser section and most tar products are moving steadily.

GLASGOW Although in some sections of industry business was at normal levels, the general position during the past week was rather quieter. Prices generally have remained firm, but some increases have taken place. A varied flow of inquiries has been received for export and the market continues satisfactorily. In regard to fertilisers, here again the position is in keeping with seasonal demands.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents),' which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London, WC2, price 2s 6d including postage; annual subscription £6 6s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection. 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. Dates on which these applications will be open to inspection are given in 'Official Journal (Patents)'.

ACCEPTANCES

Oxyalkylated fatty amine salts. Poor and Co. **772 104**

Bis (dihalocyanovinyl) terephthalates. Dow Chemical Co. **772 329**

Bis (halocyanoethyl) terephthalates. Dow Chemical Co. **772 080**

Nitrosamines. Du Pont de Nemours, E. I., and Co. **772 081**

Injection solutions containing pyridine carboxylic acid N-hydroxymethyl-amides. Cilag Ltd. **772 219**

Reforming gasolines or gasoline fractions by platinum-containing catalysts. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **772 407**

Alkaloid extraction processes. Boehringer Sohn, C. H. **772 122**

Liquid-flow meters. Hewlett, A. J. (Wayne Pump Co.). **771 949**

Δ^1-Hydrocortisone production. Upjohn Co. [Addition to 752 523.] **772 106**

Titanium alloy. Dow Chemical Co. **771 952**

Chlorination process. Chem-patents Inc. **772 126**

Imidazolinepropionates in forms of metal salts, acid addition salts, and free acids. Rohm and Haas. **772 223**

Gas filters. United States Rubber Co. **771 954**

Recovering purified mercury from impure mercury containing alloying metal impurities. Olin Mathieson Chemical Corp. **772 226**

A dialylnitrosamine. Olin Mathieson Chemical Corp. **772 331**

Aliphatic dicarboxylic acids and resulting acids. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **772 410**

Pigmented polymers of ethylene. Monsanto Chemical Co. **771 955**

Unsaturated polyfluorinated organic compounds. Haszeldine, R. N. [Divided out of 772 109.] **772 110**

Process of and apparatus for treating solid or liquid substances with gases. Metallges. AG. **772 864**

Detection of leaks in vacuum apparatus. Standard Telephones and Cables Ltd. **772 474**

Manufacture of gases containing hydrogen by conversion of hydrocarbons. Office National Industriel de l'Azote. **772 787**

Dispersal of fungicides, insecticides, herbicides and the like. Fraser, R. P. **772 591**

Thermosetting condensation products and products produced by this process. Vogel, R. E. **772 475**

Drying gaseous chlorine or hydrogen chloride containing water vapour. Wacker Ges. für Elektrochemische Industrie Ges. **772 477**

Hydroisomerisation of hydrocarbons. Gulf Research and Development Co. **772 478**

Cyclopentanophenanthrene derivatives. American Syntex Inc. **772 799**

Azo-dyestuffs insoluble in water on mixtures of polyamide fibres with animal or vegetable fibres. Farbwerke Hoechst AG Vorm. Meister, Lucius, and Brüning. **772 593**

Dry, cold-water-soluble binding agents, adhesives, finishing agents and the like from starch, a urea and an aldehyde. Naamlooze Vennootschap W. A. Scholten's Chemische Fabrieken. **772 479**

Aluminium compounds. Farbwerke Hoechst AG Vorm. Meister, Lucius, and Brüning. **772 480**

Esters of carbamic acids with tertiary and secondary acetylenic alcohols. Schering AG. **772 721**

Control of chemical plant. Simon-Carves Ltd., Todhunter, K. H., and Luft, N. W. **772 866**

Amino-acid derivatives. National Research Development Corp. **772 836**

Leaching uranium ores using alkaline metal or ammonium carbonate and bicarbonate. Minister of Mines and Technical Surveys of Canada. **772 867**

Stable finely divided alkyl amine dyes. Allied Chemical and Dye Corp. [Addition to 760 116.] **772 800**

Process and apparatus for electrodialysing liquids. Ionics Inc. **772 861** and **772 862**

Continuous process for alkylation of phenols. Esso Research and Engineering Co. **772 483**

Obtaining nitrous vapours and alkali metal hydroxides from alkali metal nitrates. Danieletto, C. M., and Canosa, A. P. **772 656**

Preparation of trifluoropropenes. Haszeldine, R. N. **772 484**

Introducing metal powders into solvents and dispersion media. Eckart, J., and Eckart, C. **772 841**

Steroids. Pfizer, C. and Co. Inc. **772 657**

Device for treating liquid cast iron with a reagent. Gutehoffnungshütte Sterkrade AG. [Addition to 746 594.] **772 842**

Alkylene polyamino polyacetic acid compounds. Dow Chemical Co. **772 726**

Titanium base alloys. Imperial Chemical Industries Ltd., and McQuillan, M. K. **772 534**

Non-dusting powders. Imperial Chemical Industries Ltd. **772 801**

Alkoxy aryl sulphonium salts. Stamicarbon NV. **772 727**

Dextran and therapeutic infusion fluids. Commercial Solvents Corp. **772 535**

Air sweetening of petroleum hydrocarbons. Esso Research and Engineering Co. **772 661**

Steroid compounds. Upjohn Co. [Addition to 724 094.] **772 598**

Phosphorous acid esters. Newby, H. (Chemische Werke Hüls AG). **772 486**

Pesticidal compositions containing phosphorus esters. Imperial Chemical Industries Ltd. **772 731**

Stabilising halogen-containing polymers. Wacker-Chemie Ges. **772 663**

Inhibiting growth of fungi and nematodes. Goodrich, B. F., Co. **772 955**

Composition for increasing yield of food plants. Forschungsanstalt für Landwirtschaft. **772 487**

Solvents or softeners for polyesters of terephthalic acid and aliphatic dihydroxy compounds. Farbwerke Hoechst AG. **772 600**

Water-soluble polymers containing neutralised carboxyl groups. Henkel and Cie. Ges. **772 734**

Wick atomiser for atomising liquids and mixing them with gases. Segerstad, C. G. H. Af. **772 736**

Activation of catalytic materials containing alumina supports. Esso Research and Engineering Co. **772 872**

Vinyl ethers. Rohm and Haas Co. **772 666**

Solid polythene products. British Cellophane Ltd. **772 803**

Mixing gases with liquids. Kerag Kesselschmiede Apparate-und Maschinenbau. **772 492**

Introducing foam-stabilising solutions into water streams. Pyrene Co. Ltd. **772 604**

Compositions containing tarnish inhibitors. Unilever Ltd. **772 493**

Method and apparatus for filling powdered materials into containers. Food Machinery and Chemical Corp. **772 957**

Preparation of blended fibrous materials. T.M.M. (Research) Ltd. **772 613**

Hydroxylamine. Spencer Chemical Co. **772 831** and **772 670**

Chemical treatment of plutonium hexafluoride and uranium hexafluoride. United Kingdom Atomic Energy Authority. **772 617**

Resinous polyether compositions. Imperial Chemical Industries Ltd. **772 497**

Adhesion promoters. Du Pont de Nemours, E. I., and Co. **772 675**

Insoluble metal compounds. Norddeutsche Affinerie. **772 846**

Styrene polymers. Farbenfabriken Bayer AG. **772 746**

Synthesis of esters. Union Carbide and Carbon Corp. **772 502**

Polymerisation process. Esso Research and Engineering Co. **772 676** and **772 890**

Thermoplastic polycarbonates. Farbenfabriken Bayer AG. **772 627**

Freeze-stable aqueous emulsions of natural or synthetic rubber adhesives. Minnesota Mining and Manufacturing Co. **772 848**

Hydroxylamine salts. Spencer Chemical Co. **772 832**

Metallic aluminium pigment compositions. Aluminium Co. of America. **772 507**

Treatment of synthetic fibres in order to render them suitable for carding. Naamlooze Vennootschap Onderzoekingsinstituut Research. **772 629**

Exothermic vapour-phase processes. Esso Research and Engineering Co. **772 680**

Trinitrotoluene manufacture. Aktiebolaget Chematur. **772 895**

Crystalline alkali metal silicates. Diamond Alkali Co. **772 852**

Metals and alloys free from undesired gases. Nyby Bruks Aktiebolag. **772 515**

Piperidines. Ciba Ltd. **772 516**

Gas-sealed liquid systems. Foster Wheeler Ltd. **772 765**

Production of calcium cyanamide. Soc. Belge d'Electrochimie SA. **772 518**

Liquid storage vessels. Uttley, Ingham and Co. Ltd. **772 634**

Quinoline aldehydes. Raschig, F., Ges. [Addition to 710 192.] **772 520**

Sequestering polyvalent metal ions. Atlas Powder Co. **772 820**

Preparing a phthalic acid by oxidising di-isopropylbenzene. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **772 635**

Cross-linking polymers. Kellogg, M. W., Co. **772 522**

Classified Advertisements

CLASSIFIED RATES: All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra. Up to mid-day Tuesday for insertion same week.

SEMI-DISPLAY: 30/- per inch. Three or more insertions 25/- per inch.

SUBSCRIPTION: Annual Subscription of 52/6 brings 52 weekly copies of CHEMICAL AGE direct to your address from the printer (postage paid by the publishers), and a copy of CHEMICAL AGE YEAR BOOK.

COMPANY MEETINGS AND REPORTS: £12.12.0 per column. Three column measure (approximately 360 words).

EDUCATIONAL

A.M.I.CHEM.E.—More than one-third of the successful candidates since 1944 have been trained by T.I.G.B. All seeking quick promotion in the Chemical and Allied Industries should send for the T.I.G.B. Prospectus. 100 pages of expert advice, details of Guaranteed Home Study Courses for A.M.I.Chem.E., B.Sc.Eng,, A.M.I.Mech.E., A.M.I.Prod.E., C. & G., etc., and a wide range of Diploma Courses in most branches of Engineering. Send for your copy today—**FREE.** T.I.G.B. (Dept. 84), 29, Wright's Lane, London W.8.

SITUATIONS VACANT

An old-established but progressive firm of Chemical Manufacturers in East London has a vacancy on its production staff for a

CHEMIST

WITH FIRST-CLASS HONOURS DEGREE

and preferably with Chemical Engineering qualifications. Previous experience in management and production essential.

Applications are invited from suitable men between ages 30-40 years.

The position is a progressive one and the person selected will be given the opportunity of qualifying for **WORKS MANAGERSHIP.** Salary commensurate with experience and responsibility will be paid. Apply in confidence, stating age, Nationality, qualifications, experience, etc., to

MANAGING DIRECTOR,
BOX NO. C.A. 3518, CHEMICAL AGE,
154 FLEET STREET, LONDON, E.C.4.

CHEMICAL ENGINEER. Consulting organisation handling Petroleum, Nuclear and Chemical Plants require a Senior Chemical Engineer. He should be capable of assuming full responsibility for all process design on large contracts including flow-chart development, design and specification of equipment, and liaison with client. Applicants must have had similar experience preferably in the field of petroleum processing. Please send full details of qualifications, experience and salary envisaged, to **HEAD WRIGHTSON PROCESSES LTD., 24-26, BALTIC STREET, E.C.1.**

MECHANICAL ENGINEER, for senior position required for design work on Petroleum, Chemical and Nuclear plants by London consulting organisation. B.Sc. and some industrial experience are minimum qualifications. Please send full particulars of qualifications, experience and salary envisaged, to **HEAD WRIGHTSON PROCESSES LTD., 24-26, BALTIC STREET, E.C.1.**

FOR SALE

FOR SALE: 10 tons **NEUTRONYX** Ethylene Oxide **DETERGENT.** 230 tons Tar in casks of 220 litres. 12,500 **AIRCRAFT** Sparking Plugs, A.C. type. 21 High Capacity Selenium Battery Chargers, max. 700 amp./h. 20 tons Phosphoric Acid **"PASSIVANT"**, in 20-litre demijohns. 105 tons Abrasive Cloth and Papers. 15 tons **NITRO-CELLULOSIC** Lacquers and Varnishes. 2 Mechanical Lathes, new, 220/380 v., 50-60 cycles, 3-phase. Automatic Gear Change, South Bend type. 2 tons Products for development of Colour Photography. 1 Crane, Michigan type, 15 tons, new. Further particulars from **SOCOMO, 43, RUE BEAUBOURG, ARC 52.74, PARIS** (3e), **FRANCE.**

MORTON, SON AND WARD, LIMITED, STAINLESS STEEL VESSELS

VESSELS of all shapes and sizes, jacketed or unjacketed—with stainless steel mixing gear to requirements; also stainless steel storage tanks and vacuum vessels.

"MORWOOD" "U"-shaped TROUGH MIXERS—up to 2 tons, in stainless steel, with agitators, scroll or paddle type, jacketed or unjacketed.

Stainless Steel **TROUGHS, TANKS** and **CYLINDERS** made to requirements.

These items can also be fabricated in mild steel.

JACKETED PANS

100g., 150g., and 200g., new, in mild steel, for 100 lb. p.s.i. w.p.—with or without mixing gear.

3 cwt. TROUGH MIXERS by **CHALMERS** and **GARDNER**—stainless steel-lined troughs.

50g., 75g. and 100g. heavy duty **MIXERS** by **FALLOWS** and **BATES.** Agitators driven through bevel gears from fast and loose pulley.

200g. cast-iron **JACKETED MIXING VESSEL** with nickel-chrome impellor type agitator driven through bevel gears from fast and loose pulley.

AIR COMPRESSORS

THREE 30 c.f.m. at 100 lb. pressure, water cooled, automatic overloads, with or without motors.

AIR RECEIVERS MADE TO REQUIREMENTS. PUMPS

Selection of new MONO and second-hand Pumps in stock—2 in. to 5 in.

Inquiries Invited.

MORTON, SON AND WARD, LIMITED,
WALK MILL,
DOBCROSS, NEAR OLDHAM,
Lancs.
Phone Saddleworth 437

PHONE 98 STAINES

3,000-gal. Stainless Steel Cylindrical Enclosed Tank.
26,500-gal. Sec. Steel Cylindrical Enclosed Tank.
6 ft. by 3 ft. diam. Stainless Steel Autoclaves.
40 ft. Stainless Steel Enclosed Elevator.
100-gal. Stainless Steel Jacketed Pan, 60 w.p.
'Porcelain' Ball Mill, approx. 18 in. by 18 in. diam.
'Z'- and Fin-Blade Mixers, Pumps, Hydros, Refiners, Conveyors, Stackers, Loaders, Condensers, Crushers and Grinders.

HARRY H. GARDAM & CO. LTD.

***BOX NUMBERS:** Reply c/o "Chemical Age" · Bouverie House · Fleet Street · EC4*

FOR SALE: continued

MIXERS—1 Baker Hand-tilted Trough, 16 in. by 24 in. by 20 in Fast and loose pulleys and clutch. "Z" blades.
1 Ditto Power-tilted Trough, 30 in. by 20 in. by 24 in. Pulley drive and clutch. Four "L" blades.
THOMPSON & SON (MILLWALL), LTD.,
LONDON, E.14.
TEL.: EAST 1844

The **BOARD OF TRADE** has for disposal, ex-store at West Wratting, Cambridgeshire, approx. 198 tons of **BORIC ACID**, packed in cotton-lined hessian bags, approx. 1 cwt. each. Full particulars and forms of tender (returnable by the 21st March) may be obtained on application to the Board of Trade, C.G.7 (b), Room 301, Lacon House, Theobalds Road, London, W.C.1 (Telephone No. Chancery 4411, ext. 295 or 310).

VACUUM SHELF DRIER—4 ft. 7 in. by 3 ft. by 3 ft. 3 in., with three steam-heated shelves and six-clamp balanced door. **WINKWORTH MACHINERY, LTD.,** 65 High Street, Staines. (Telephone: 1010.)

Four **"AIR RECEIVERS"**—29 ft. by 7 ft. for 350 lb. w.p., in unused condition, suitable for pressure vessels or steam accumulators. **BOX NO. C.A. 3527, CHEMICAL AGE, 154 FLEET STREET, E.C.4.**

WANTED

INDUSTRIAL BY-PRODUCTS, LTD., 16, Philpot Lane, London, E.C.3. will be pleased to receive particulars of any by-products, waste materials and residues for disposal.

WORK WANTED & OFFERED

GRINDING, CRUSHING AND GRADING
FINE GRINDING LTD.,
BLACKHOLE MINE, EYAM
TELEPHONE: EYAM 227

PULVERISING of every description of chemical and other materials. Collections, storage, deliveries. **THOMAS HILL JONES, LIMITED, INVICTA WORKS, BOW COMMON LANE, LONDON E.3. (TELEPHONE: EAST 3285).**

WORK WANTED & OFFERED: continued

CRUSHING, GRINDING, MIXING and DRYING for the trade.
THE CRACK PULVERISING MILLS LTD.
Plantation House
Mincing Lane,
London, E.C.2.

PATENTS & TRADE MARKS

Notice is hereby given that **ILFORD LIMITED** seek leave to amend the Complete Specification of **PATENT NO. 650,911** for an invention entitled "Improvements in or relating to 3-Pyrazolidone Compounds".

Particulars of the proposed amendments were set forth in the Official Journal (Patents), No. 3,550 dated 27th February, 1957.

Any person may give **NOTICE OF OPPOSITION** to the amendment by leaving Patents Form No. 36 at the **PATENT OFFICE, 25 SOUTHAMPTON BUILDINGS, LONDON, W.C.2,** on or before 27th March, 1957.

J. L. GIRLING,
Comptroller-General.

The Proprietor of **BRITISH PATENT NO.** 646916, entitled "Improvements in or relating to Sulphur", offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to **SINGER, STERN & CARLBERG, 14 E. JACKSON BLVD., CHICAGO 4, ILLINOIS, U.S.A.**

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers, Valuers and Fire Loss Assessors of
CHEMICAL WORKS PLANT AND MACHINERY
York House, 12 York Street, Manchester.

Telephone 1937 (2 lines) Central Manchester.

Classified Advertisement Order Form

To The Manager
CHEMICAL AGE
Bouverie House
Fleet Street, London E.C.4

Please insert the following in your next issue and for..... weeks thereafter

Date.....

SITUATIONS VACANT	• **EDUCATIONAL**
OFFICIAL APPOINTMENTS	• **WANTED**
FOR SALE	• **INVITATION TO TENDER**
AUCTIONEERS, VALUERS, etc.	• **PATENTS**
WORK WANTED AND OFFERED	

Name .....

Address .....

Printed in Great Britain by THE PRESS AT COOMBELANDS LTD., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154 Fleet Street, E.C.4 9 March, 1957. Registered at the General Post Office. Entered as Second Class Matter at the New York U.S.A., Post Office.