The
Chemical Age

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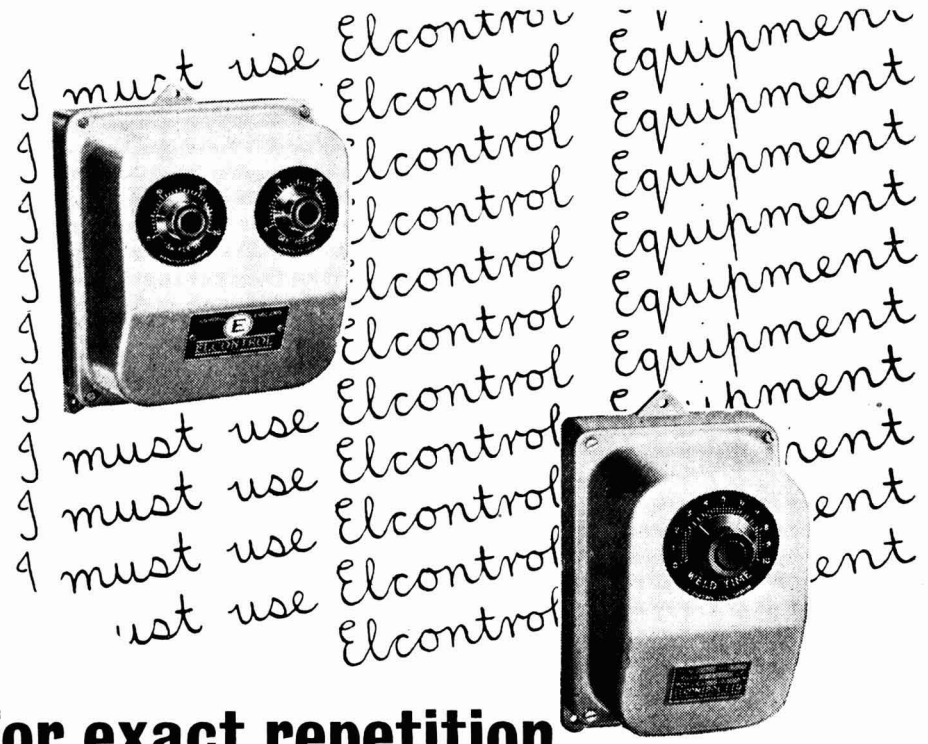

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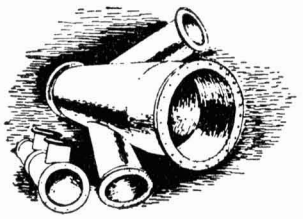

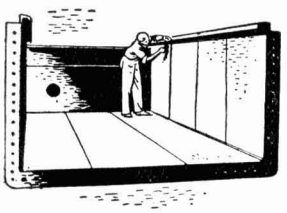

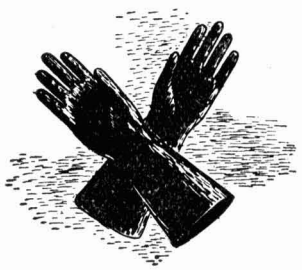

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The
Chemical Age

Established 1919

The Weekly Journal of Chemical Engineering and Industrial Chemistry

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It is with profound regret that we record the death of Queen Mary. We tender, on behalf of the chemical industry, our deep and loyal expression of heartfelt sympathy to Her Majesty The Queen and the members of the Royal Family.

The Library List

RECENT statistics given by the American Chemical Society reveal that 5,236 journals from 87 different countries are now being regularly abstracted for *Chemical Abstracts*. These five thousand or so journals are printed in 31 languages; the linguistic task is not quite as complex as this figure suggests, however, for 44.8 per cent of the journals come from English-speaking countries and in a few others (e.g., journals from Japan or Sweden) important papers are printed in English. 64.6 per cent of all the journals come from seven countries, the U.S.A., U.K., Italy, Germany, France, Japan, and Russia. Of the 5,236 journals, 1,386 are U.S. publications—or a little over 25 per cent. If the whole scientific journal output of the Commonwealth is brought together, it comprises 17.8 per cent of the world sum. However, journals cannot be measured by numbers. Some are issued only four times per annum, some are slim indeed in their sizes. Merely to add up the journals of this or that country is hardly a valid method for assessing national productivity in published research.

No doubt many scientists, and not least those who must decide which journals are to be abstracted, would like to draw some fairly firm line between journals that are truly scientific and those that are loosely called trade or technical journals. The time has gone when a clear-cut line can possibly be drawn. If pure research developments are rarely initially reported in these journals, modern technology's advances

very often have a first public airing in their pages. The very fact that there has been so little room in the established journals of pure science for 'applied' developments has taken much of the literature of expanding technology into the technical and trade journals, giving many of these private publications a far more notable purpose than may first have been envisaged for them. THE CHEMICAL AGE, as a weekly publication covering the interests of a diverse industry, must necessarily give much of its space to news and comments upon news, but as our readers know, we frequently publish technological articles and practical papers on such topics as new methods of analysis, or production, etc. Monthly technical-cum-trade journals usually give less attention to news and topical events so that in these there is often a rather higher proportion of original papers or survey-type articles. To regard these publications as non-classifiable among the scientific journals is obsolete, a reactionary view from some distant ivory tower and one that implies that modern technology is unscientific. The growth and vigour of these privately sponsored technical journals has in fact made a significant contribution to science for the journals of societies and institutions have not been able to expand in size at the same rate as science itself. Without the extra space provided by the technical journals, many a scientist would have remained unread or had his paper kept waiting in a queue long enough for its point and purpose to be lost.

One problem of ever-rising 'journal population' is the burden of costs that falls upon libraries. A librarian without limits to his spending-power is a rare and fortunate individual. The library of the university chemistry department or of the research station, state-run or industry-sponsored, may not be able to subscribe to every journal that might sometimes be useful. In a huge centre of societies and organisations like London the resultant problem is not serious—if not in every library, at least in one that is open to genuine scientists the more elusive journal will be found. In provincial cities, some of which might be considered more scientifically active (proportionately at any rate) than London, the problem is more acute. It could be partially eased if public and university libraries co-operated more closely. In one of the six major provincial cities of Britain the main public library and the university library (which are little more than half a mile apart) both subscribe to three of the best-known and most costly U.S. chemical journals. Neither library, however, subscribes to some of the lesser-known but still valuable journals. The same total amount of money per year could be spent and could provide the chemists and chemical students of that city with a wider range of the world's scientific journals.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 42s. Single copies, 1s.; post paid, 1s. 3d. SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3954/5). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784/5).

Notes & Comments

Europe & Synthetic Rubber

WE RECENTLY (CHEMICAL AGE, **68**, 229-230) discussed British proposals to initiate synthetic rubber production in Scotland. It seems to be the conclusion of experts that at the present stage of development in our chemical industry the necessary supply of chemicals for a synthetic rubber plant is not available, the principal snag being that synthetic rubber production is not economic unless very large-scale output is maintained. Current proposals to establish a European synthetic rubber union—involving Germany, France, and Italy—would seem to have sprung from similar lines of thought. Western Germany is an existent but severely reduced producer; France and Italy have both drawn up plans for a rubber manufacturing industry. Germany is apparently taking the lead in suggesting tripartite co-operation. The minimum size of plant likely to be economic in Europe is said to be a 20,000-ton annual capacity unit. None of the three countries is well supplied with capital for new developments. It is felt that each country could specialise in the low-cost production of necessary materials and intermediates and a single plant could be built at the most favourably economic site. Italy's natural gas deposits and France's oil refining and alcohol industries could be harnessed to the jointly operated rubber plant.

Political Implications

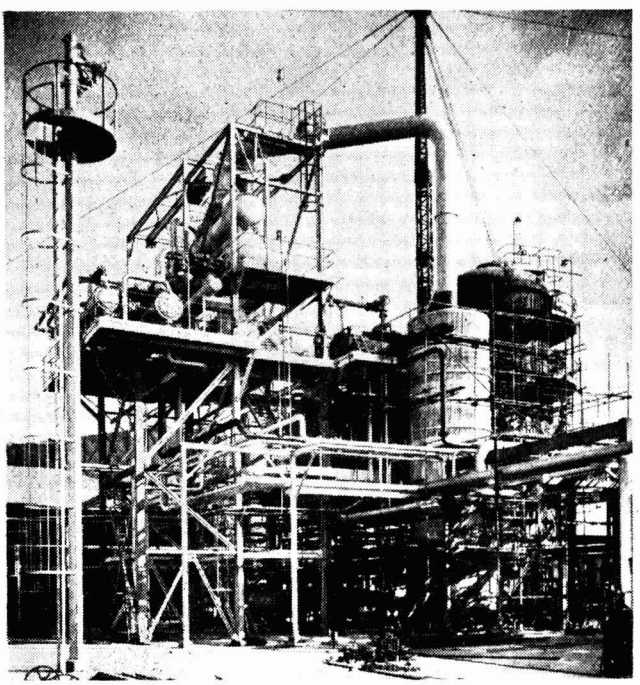
THE problem seems almost entirely composed of capital and production factors. Each country could separately consume the 20,000 tons annual output and some system of shared consumption would have to be introduced. But there is also a less obvious political factor. At present there are severe Allied Occupation restrictions upon Germany's own synthetic rubber capacity; these and not only capital shortages prevent expansion of the current 6,000 tons output at Marls. The initiative that has come from Germany for a Schuman-Plan type of union for synthetic rubber may well have been prompted by the hope that these restrictions would vanish if the Marls centre developed into the Franco-Italian-German conjoint enterprise. The project may be more subtle than it looks on the surface.

A New Antibiotic

ANOTHER new antibiotic — viomycin — will shortly be available for U.S. doctors. It is derived from a mould organism originally isolated in Florida soils. Its special claim for attention is that it has shown itself markedly effective in the treatment of tuberculosis, notably in cases where the infecting strains have developed resistance to streptomycin. Trials in 1952 at an Army hospital and further clinical studies at Howard University, Washington, have both shown that viomycin brings improvement when streptomycin has been defeated by germ resistance. The Army medical tests involved a study of 834 cases of pulmonary tuberculosis, and the Washington tests involved 35 cases. Like streptomycin, viomycin is combined with PAS (sodium *para*-aminosalicylate) in treating this disease. No signs of resistance to viomycin have yet been observed though it must not be assumed that this will not reveal itself in time. There is reason to believe, however, that resistance to viomycin will always develop much more slowly than resistance to streptomycin. Moreover, treatment with viomycin need not commence until the benefits from streptomycin have started to wane. In practice the curative effects of modern anti-TB antibiotics and chemicals are mainly given by enabling the patient to rest while the disease is held in check. The longer the resting period, the better chance there is that damaged lungs will heal naturally or that the patient can be safely given surgical treatments. Another aspect is that patients waiting to enter hospitals or sanatoria can be kept reasonably fit. Viomycin seems to offer excellent hopes that these benefits can be extended.

Pulp Trade Changes ?

CANADIAN opinion at present indicates that vast changes in pulp and paper technology are brewing (*Canadian Chemical Processing*, **37**, 1, 16-21). It is said that the new processes involved have satisfied laboratory-testing and are now approaching the pilot-scale investigation stage. The nature of the likely changes seems somewhat secret, though there is already a firm realisation that the pattern of chemical requirements in pulp processing will be altered considerably. There are in any case known and changing trends in the Canadian pulp industry today, and it is possible that the suspected 'revolution' will be no more than an intensification of these trends. In conservative and bulky industries sweeping changes in methods rarely occur and development is almost invariably achieved at the steady rate of evolution. If this view is correct, then the changes to be expected are (1) greater use of peroxide bleaching agents accompanying the greater use of groundwood; (2) greater use of mechanical 'cooking' systems or what are known as 'semi-chemical' pulping processes; (3) more production of sulphur dioxide at mills, involving less purchase of pre-manufactured sulphite; (4) intensified bleaching using peroxide or chlorine dioxide; and (5) more sulphate pulp production. Probably the most striking chemical change in this list of possibilities is the wider use of peroxide for bleaching. It would call for very big increases in hydrogen peroxide production either in Canada or in the United States. A complete replacement of the sulphite treatment in Canada with peroxide bleaching might require more hydrogen peroxide than total U.S. output. No one seems to anticipate any change as large as this, but inasmuch as peroxide processes develop they must certainly shift the chemical demand of this industry from a readily available substance to one that has so far been in much more limited supply.



This photograph shows the new 17,500-BPD vacuum flasher which has just been completed for Anglo-Iranian Oil Co., Ltd., at Grangemouth, Scotland, by the Kellogg International Corporation. It will provide fresh feed for a 10,000-BPD fluid catalytic cracker currently going on stream for AIOC. Kellogg designed the unit

Scientific Progress Delayed

DSIR Report Expresses Concern over 'Inadequate Effort'

STEADILY deepening concern at the relation between Britain's scientific needs and her scientific resources is again the recurrent theme emphasised by the advisory council of the Department of Scientific and Industrial Research in its Report for the Year 1951-52 (Cmd. 8773, HMSO, 8s. net).

In its previous report (THE CHEMICAL AGE, **66**, 673), the council expressed considerable anxiety at the delay in giving effect to the post-war plans of the DSIR. It was pointed out that these plans had been approved by the Government in 1946 as the minimum necessary to enable the department to play its part in ensuring that science made its full contribution to national problems and particularly to increasing industrial efficiency.

It was urged that special steps should be taken to remove the obstacles hindering the development of these plans which were required alike by the economic and defence problems of the country. Nothing had occurred since to mitigate in any way the anxiety of the council, then expressed.

The severe limitations upon man-power and accommodation gave rise to the difficulty, common to all establishments of the DSIR, namely, the drawing of a balance between advisory and *ad hoc* work on the one hand, and longer range research on the other.

Dissemination of Information

It is of the utmost importance that existing information should be widely disseminated and used to the full, but inquiries received by the DSIR establishments inevitably disclosed deficiencies in knowledge that must be made good before a fully satisfactary answer could be given to a number of them. As industry advances and becomes more conscious of the help to be gained from science, these deficiencies would certainly become more serious unless the reservoir of scientific knowledge from which the answers were derived was enlarged by further research.

Inadequacy of the effort which the DSIR establishments could devote to longer range research was the cause of great concern. Basic research was hardly worth while doing if the effort which could be devoted to it was insufficient to secure steady progress, and the suggestions made from time to time to reduce the present meagre effort appeared to be ill-founded.

It was the opinion of the council, firmly expressed, that there is no alternative to the planned expansion of the DSIR recommended six years ago by its predecessors.

Similar considerations applied to the research associations. Few, if any, had incomes large enough to be able to deal with all that required doing, and they often found that essential basic work was elbowed out by more immediate problems, and that in dealing with those, there was a danger of trying to pursue too many objectives at the same time.

Interest in Industrial Processes

Research associations, the council noted, were becoming more interested in the analysis and study of industrial operations and processes. Although this type of work, now usually described as operational research, was by no means new or unusual in industry, there had recently been a greater realisation of the important part that a scientifically-trained man could play in it.

While operational research was no substitute for laboratory research, it was often of particular value in showing where the latter could be most profitably directed. Many of its results could be applied with substantial capital outlay, and had the advantage of enabling better use to be made of existing machinery and labour.

In the DSIR report for 1948-49 reference was made by the council to the appointment of a committee under the chairmanship of Mr. H. W. Cremer, to review the need for research in chemical engineering and the extent to which it could be met by existing facilities.

The report has now been published and considered. In it the committee drew a distinction between chemical technology, which is concerned with the processes for the manufacture of particular products, and chemical engineering, which is concerned with the study of plant operations applicable to many industries.

Inquiries showed that research needed in chemical engineering was of two kinds—(1) experimental studies of a fundamental nature on basic operations such as drying, grinding and evaporation, and (2) the provision for use in design of practical quantitative data derived from observations of large-scale plant.

Establishment of Central Organisation

In the opinion of the committee the second need could only be met by the establishment of a central organisation, working in collaboration with manufacturers in such a way as to ensure correlation between basic research and actual operations. One of the principal functions of such an organisation would be to collect, interpret, and distribute information relating to chemical engineering, much of which is at present unknown to users, or difficult to obtain.

Absence of facilities for the systematic study of plant was one of the chief reasons why so many discoveries and new processes of manufacture that originated in Britain had been developed abroad, with the result that they were now operated here under foreign licences or with foreign plant. Further, the committee added, the industrial exploitation of research was now so rapid that unless specifications and estimates for equipment could be submitted quickly and accurately, orders would be lost to other countries.

The council of the DSIR agreed with the committee that national interest demanded the creation of some form of central organisation and the matter had been discussed with the Association of British Chemical Manufacturers and the British Chemical Plant Manufacturers' Association.

As a result these bodies had decided, on their part, to have a more detailed study made, by a specially appointed officer, of the information already available in industrial research establishments and of the resources of those establishments for carrying out further investigations. This study, depending on his findings, might be followed by the setting up of a properly staffed documentation unit. It was expected that this further survey would require six to 12 months to complete.

One particular research need to which attention had been called by the committee, namely the fundamental study of basic processes, could be partly met by further research at universities and elsewhere. The Government, through the University Grants Committee, had given special grants for increasing the facilities for chemical engineering at certain universities, mainly for post-graduate training.

In view of the emphasis laid by the Cremer Committee on improved documentation, arrangements had been made by the DSIR to prepare bibliographies of selected topics. One on drying had been completed, and copies were available to inquirers. A second on crushing and grinding had been initiated in co-operation with the Institution of Chemical Engineers.

Thanks to the timely and generous co-operation of the Nuffield Foundation, which had agreed to share costs with the DSIR, it had been possible to proceed with the Manchester University scheme for the erection of a radio-telescope at Jodrell Bank.

On the advice of the Nuclear Physics Committee of the Ministry of Supply, the council had recommended a grant to Cambridge University to cover the cost of constructing and operating a linear electron accelerator, rated at approximately 350,000,000 electron-volts. This would complete the committee's general post-war plan to establish particle accelerators on a suitable major scale at the Universities of Birmingham, Cambridge, Glasgow, Liverpool and Oxford. Grants totalling some £650,000 had been provisionally recommended to the five universities named to enable them to meet recurrent expenditure during the period 1952-57.

Although the right kind of scientific work was generally being carried out, the question still remained whether the arrangements for placing the results before industry were satisfactory.

Scientific Advisory Service

A proposal had been made from time to time that a national scientific advisory service for industry should be established and developed on regional lines. The council felt, however, that the industrial field was so huge and diverse that the proposal was impracticable, quite apart from the lack of trained scientists that would be required to man such a service. The DSIR had, therefore, made a number of contacts with Chambers of Commerce, Industrial Associations, Regional Boards for Industry, technological colleges and groups of librarians with which

a number of schemes had been formulated with the aim of providing local technical information services.

These were experimental approaches to the problem of how to increase the use made of available information, but endeavours were being made to obtain more reliable information on which to base future activities. Assistance had been given, for example, to the Manchester Joint Research Council in making a survey of technological resources and the requirements of industrial firms in the north-west region. A report on this survey was awaited with interest.

Although technical information and help were easy to acquire there were, it appeared, still many firms which made no attempt to obtain them despite the profit that would accrue from such knowledge. Efforts were being made to discover whether this was because the publicity for existing technical services was inadequate or because the form in which the information was available was unsuitable to the requirements of many types of user.

The council, however, states emphatically that it was becoming more and more convinced that science would never be adequately used in Britain until many more scientists and technologists were employed throughout industry, not omitting the direction and management.

In the council's opinion the much higher proportion of scientists and engineers employed in the U.S.A. and other leading industrial countries was a fact of the greatest significance. Unfortunately, the technically trained men required do not exist in anything like sufficient numbers, and Britain had lagged behind other countries in providing facilities for their training.

Importance of Human Factor

A most important factor in the problem of increasing productivity in industry today was the human one. The recommendations in this respect made by the DSIR and the Medical Research Council have been accepted by the Privy Council which has announced the appointment of two committees to study human problems in industry. One will deal with individual efficiency and the other with human relations.

An effort to contribute to the general economies made in the Government service had been made and while the effect had not been to eliminate any major plan or activity it had been necessary to slow down some work and to arrest for the time being most of the planned expansions of activities.

In the Chemical Research Laboratory the transference of staff and equipment to the new permanent building for radiochemical research which had begun in May had been completed. This had made possible the provision of more laboratory space for other research groups.

Two recent projects undertaken by the Corrosion of Metals Group in the fundamental field were: (a) an intensive study, with the aid of electron diffraction technique, of the early stages of oxidation of electrolytically polished copper surfaces which was made primarily to obtain data for use in formulating or testing theories on the oxidation of metals at temperatures below about 250°C., and (b) the application of radioactive tracer techniques in the study of corrosion inhibitors.

Vapour Phase Inhibitor

Study of the use of cyclo-hexylamine carbonate as a vapour phase inhibitor had shown that under conditions in which the moisture condensed on the specimen copper was heavily attacked. If, however, actual precipitation of moisture on the copper was prevented, the presence of cyclo-hexylamine carbonate gave very satisfactory protection.

Scope of the group had recently been extended to include corrosion at elevated temperatures under conditions both of immersion (boiler corrosion) and of exposure to hot flue gases.

In the Inorganic Group field trials of fertilisers produced from rock phosphate by the use of a mixture of nitric and sulphuric acids were in progress. The primary objectives of the microanalytical section had been to increase the speed of analysing samples, and to place on a sound basis the inorganic techniques employed. A method for determining active hydrogen by means of lithium aluminium hydride was being developed.

The main effort of the Organic Group had been applied to the isolation of selected organic compounds in a high degree of purity and to the precise determination of their physico-chemical constants; part of this programme was being carried out in collaboration with the National Physical Laboratory.

Studies in purification of organic compounds, at first devoted to pyridine and its homologues, had been extended to include

phenol homologues and hydrocarbons. The experience gained in these refined techniques had been placed at the disposal of workers in industrial laboratories, and others, as an advisory service.

Another important line of work which had been pressed forward was the preparation of lower members of various series of hydrocarbons in a state of purity.

Altogether some 36 pure compounds, chiefly hydrocarbons, were now available as standard samples for distribution. During the first eight months of 1952, 180 specimens were sent out to other laboratories—an increase over the number despatched in the corresponding period of the previous year.

Recent work on the synthesis and application of isotopically-labelled compounds had resulted in a method for the estimation of naphthalene in tar and oil fractions which depends upon the use of isotopically-labelled naphthalene.

The research programme of the High Polymers Group contained two main topics: —(a) studies of the ion-exchange and allied properties of high polymers, and (b) investigations on the fractionation of polymers according to chain-length.

In connection with the work on polymer fractionation, the discovery was made during the year of the outstanding performance of poly-(vinyl alcohol) films as semi-permeable membranes in non-aqueous systems. An added advantage of these films was their rapid transfer of solvent which enabled osmometers of simple design to be used. The discovery was of considerable scientific interest and was likely to be of value in providing a ready means for controlling the quality of industrial polymers. Apart from their use in osmometry, membranes of this type might find application in dialysis and similar techniques.

Production of Sulphur

A major item of research in the Microbiology Group was the study of the microbiological production of sulphur. Chief problems in this work were: (1) to speed up sulphate production by the bacteria, (2) to find a cheap and abundant source of oxidisable material suitable for bacterial sulphate reduction, for example, sewage or other waste, and (3) the development of the process to large-scale production when the first two problems had been solved.

Among the work of the research associations what the report describes as 'in the nature of a minor social revolution' may take place if the new lubricant produced by the Lace Research Association is found to be a satisfactory substitute for graphite in the cleaning of textile mill machinery.

The stage between laboratory and pilot plant testing and large scale use in industry is always the most searching in any major research operation and some troubles have been encountered. The composition of the lubricant, while not yet perfected, has been continually improved, and the new lubricant was giving good results on a large number of machines.

More Kel-F Available

THE new plant for the production of Kel-F fluoro-chloro-carbon plastics at its manufacturing and development centre, Jersey City, will soon go 'on stream,' it was announced recently by Louis C. Rubin, manager of the Chemicals Manufacturing Division of the M. W. Kellogg Company, a subsidiary of Pullman Incorporated.

Because of its unusual combination of properties—resistance to virtually all acids and alkalis, ability to withstand a wide range of temperatures, high dielectric strength, zero moisture absorption and ready mouldability —Kel-F has already established itself as an exceptionally useful material, particularly in the chemical, pharmaceutical and electronic industries.

A large proportion of the production of Kel-F at present is being devoted to defence purposes but the additional supplies from the new plant will make it available for widespread non-military applications.

A number of manufacturers have already completed development work on new products either made completely of Kel-F or incorporating this fluorocarbon-type plastic with metal parts or other materials. It is expected that the production rate of the new plant will make it possible to supply these customers with sufficient amounts for them to go ahead with their manufacturing plans, said Mr. Rubin.

Some of the plant equipment was expected to be started up in February, while, according to schedule, the whole unit should be turned over to regular commercial production by the end of the first quarter of this year.

'Autofining' on a Commercial Scale

Results of Six Months' Test at Llandarcy

AUTOFINING,' a new catalytic desulphurisation process developed by the Anglo-Iranian Oil Company, Ltd., was first reported in THE CHEMICAL AGE (**66**, 533), about a year ago when the process had been fully proved in extended operations in a 350-barrel-per-day pilot plant.

Further notes entitled 'The Autofining Process—Booklet No. 2,' in the form of a loose-leaf folder with a simplified flow sheet diagram and photographs of various items of the equipment have now been issued by the company, describing developments since then. The first commercial size unit of 3,500 barrels per stream-day input capacity has now been in operation for six months at the National Oil Refineries, Ltd. Llandarcy, South Wales.

The 'Autofining' process operates at pressures of 50-300 lb. gauge and at temperatures of 700-800°F. and makes use of a very stable sulphur resistant catalyst which has a long life. The catalyst is regenerated periodically, the on-stream period varying with the boiling range of the feed stock. A small amount of gas, consisting mainly of hydrogen, is produced in the process and this is recycled. No hydrogen manufacturing facilities are required.

Constant Pressure Operation

Constant pressure operation is normally employed with the lighter feedstocks. A small excess gas make is vented from the system to keep the pressure constant. It is desirable, however, when maximum sulphur removal is required to operate the unit under equilibrium pressure conditions. Under these conditions full use is made of the hydrogen produced and no excess gas, except that dissolved in the liquid product, is removed from the system.

A wide variety of feed stocks can be effectively desulphurised, ranging from natural and straight run gasolines through naphthas and kerosines to gas oils and light diesel fuels. Sulphur removed from the feed stocks is largely converted into hydrogen sulphide. The products are of good colour and odour and are very stable. They need no subsequent refining treatment. The yields of liquid products obtained are 99 per cent plus by weight or about 100 per cent by volume.

The process is covered by patents or patent applications in all major countries.

In 1948 a 150-barrel-per-day pilot plant was commissioned in Scotland at the Grangemouth refinery of Scottish Oils, Ltd. This was enlarged a year later to 350 b.p.d.

Used as Production Unit

Since May, 1950, the unit has been used as a production unit to desulphurise a kerosine sulphur dioxide extract which is used as a high octane blending component in power kerosines (Tractor Vaporising Oils). The unit operates at 3.0 v/v/hr., about 100 p.s.i.g. pressure, 2,000 SCF/B recycle rate and 780°F. temperature; the on stream period between regeneration is about 200 hours. The catalyst charge has, so far, been in use for 16,000 hours during which period it has been regenerated about 100 times.

Typical results on this unit were:—

	Feedstock	Product
Specific Gravity 60°F/60°F	0.870	0.867
Gravity °API	31.1	31.7
I.B.P. °F	327	311
10 per cent vol. at °F	347	347
50 " " "	388	383
90 " " "	486	483
F.B.P. °F	563	567
Total Sulphur per cent wt.	1.04	0.45
Sulphur Removal per cent	—	56.8
Octane No. (M.M.) Clear	76	77

A 3.50 b.p.d. unit operating on naphtha for petroleum spirits (white spirit) and power kerosine (tractor vaporising oils) in blocked operation was commissioned at Llandarcy refinery in South Wales, in July, 1952.

In this unit the feed stock and the recycle gases are heated in separate heaters and pass downwards through the reactor. The hot vapours from the reactor pass through a waste heat boiler, where steam is generated; after heat exchange and cooling, the products flow to the separator from which the recycle compressor takes suction.

If it is desired to meet a colour specification with products such as power kerosines, the products leaving the waste heat boiler pass into the knock out tower where about 1 to 2 per cent volume of heavy ends are removed. Any excess gas make is passed to fuel from the product separator. Liquid

product from the separator passes to a flash tower stabiliser to remove the hydrogen sulphide and other gases which results in flash point rectification. The stabiliser product is normally free of hydrogen sulphide but a light caustic soda wash is given to guard against poor stabiliser operation.

Design conditions for this unit on either feed stock are:—

Pressure	100 p.s.i. ga.
Reactor Temperature	780° F.
Space Velocity	3.0 v/v/hr.
Gas Recycle Rate	2000 SCF/B

Data given below are typical of the results obtained when operating under these conditions.

Power Kerosine (Tractor Vaporising Oil)

	Feedstock	Product
Specific Gravity 60°F/60°F	0.824	0.820
Gravity °A.P.I.	40.2	41.1
I.B.P. °F	309	298
10 per cent vol. at °F	336	329
50 ,, ,, ,,	383	381
90 ,, ,, ,,	460	453
F.B.P. °F	511	496
Sulphur per cent wt.	0.645	0.106
Sulphur Removal per cent	—	83.6
Colour Saybolt	+10	+21
Corrosion (Cu strip at 212° F)	Pass	Pass
Octane Number (M.M.) clear	43.5	47.0

Approximately 1.5 per cent volume bottoms was removed in the knock out tower.

Naphtha for Petroleum Spirit (White Spirit) Production

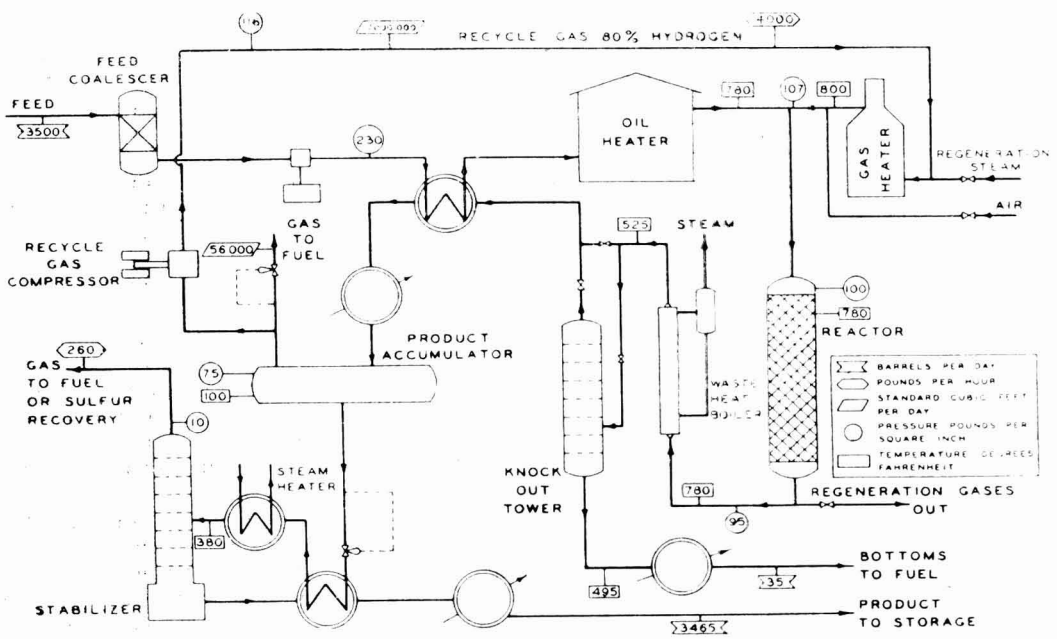
	Feedstock	Product
Specific Gravity 60°F/60°F	0.780	0.780
Gravity °A.P.I.	49.9	49.9
I.B.P. °F	302	293
10 per cent vol. at °F	318	318
50 ,, ,, ,,	338	338
90 ,, ,, ,,	374	372
F.B.P.	408	412
Sulphur per cent wt.	0.143	0.003
Sulphur Removal	—	97.9

The consumptions of utilities in the 3,500 b.p.s.d. commercial unit at Llandarcy when operating under full design conditions are:—

150 lb. Steam	6,600 lb./hr. (nett)
Cooling Water	30,000 Imperial gallons hr.
Fuel	25 million B.T.H./Hr.
Electric Power	10 kW.

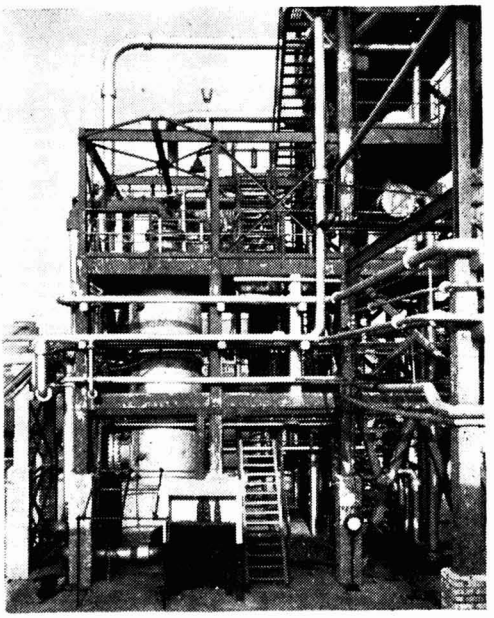
In this plant, the recycle gas compressor is driven by the steam generated in the waste heat boiler.

Total erected cost of the commercial plant at Llandarcy within battery limits was approximately £250,000. Of this total cost, materials including common building materials, draughting, engineering, procurement and contractors' overhead profit, amounted to £196,000.

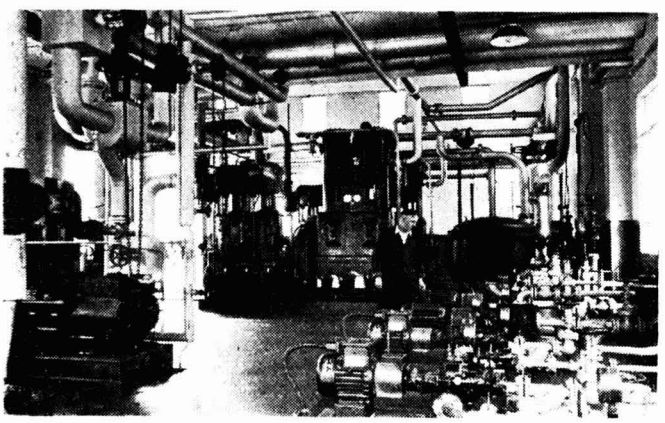


3500 BPD autofining unit

THE photographs reproduced on this page show some of the equipment at Llandarcy, South Wales, for the first commercial size unit for the 'Autofining' catalytic desulphurisation process developed by the Anglo-Iranian Oil Co., Ltd. The 3,500 barrel-per-stream day unit was commissioned in July, 1952.

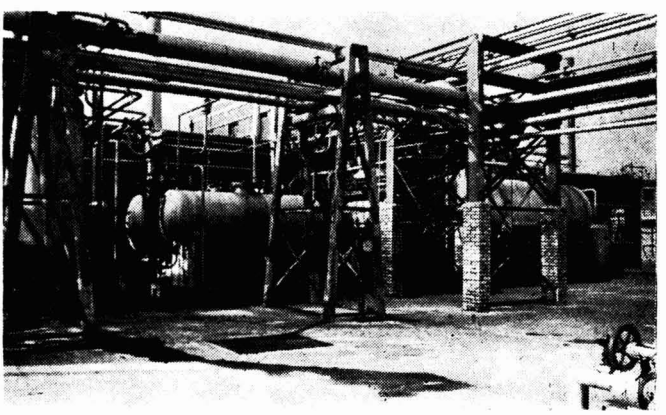


Right: A view of the reactor with product coolers (top right)



The pump house at Llandarcy refinery (left) showing the recycle compressor in the centre background and the stillite filter in the right background

(*Anglo-Iranian Co., photographs*)



Right: Another stage in the process. The coalescers are seen (extreme left) with caustic soda vessels (left centre) and separator (right). The control and pump house is in the background

Phenylhydrazine

Some Applications for its Derivatives

PHENYLHYDRAZINE, whose early applications are associated with the identification of sugars, was first obtained in 1877 by Emil Fischer who reduced potassium benzene sulphonate with sulphurous acid. Later, by virtue of its reactions with certain diketones, it was then linked with the synthesis of certain heterocyclic derivatives such as the pyrazoles and pyrrols. The use of the pyrazolones as antipyretics saw its introduction into medicine and the synthesis of pyrazolone dyestuffs as tetrazine again suggested a new application in industry, where such dyestuffs were of use in colouring rubber and plastic compositions.

In later years more uses have been found for the free base and its derivatives. Apart from being a skin irritant the free base is an active blood poison, and by virtue of its hæmolytic destruction of the red corpuscles it now finds application in certain blood disorders signified by a morbid excess of erythrocytes as in polycythemia vera. There is, however, a noted decrease in toxicity on acetylation, and the reduction of methæmoglobin formation *in vivo* increases from the β acetyl to the β diacetyl derivative. In the field of biochemistry and isolation of such hormones as those of the *corpeus luteum* has been achieved by the use of phenylhydrazine-4-sulphonic acid.

Employed as Peptising Agent

In the rubber industry phenylhydrazine has been employed as a peptising agent for both natural and synthetic rubbers and in the reclaiming of butalastic waste, although its toxic nature precludes its use in this respect. Other derivatives have proved useful in horticulture; thus the hydroxyphenylhydrazines have been successfully employed as seed disinfectants against infection from fungi, viruses and plant nematodes, etc., and the sulphuric acid derivatives have been utilised as wood preservatives. In the ever-expanding search for new detergents in the textile industry, sulphonated phenylhydrazines, including such compounds as 2-hydrazinonaphthalene-6: 8-disulphonic acid, have been added to the list of new wetting and detergent compositions.

Recent introductions in photography for direct photographs using silver halide involve the use of the free base, and synthetic resins as 2-phenylhydrazine-4: 6-diamino-s-triazine have recently been prepared for possible use in the electrical trades.

Microscopical Methods

Symposium & Exhibition in London

RECENT developments in microscopical methods were illustrated at a symposium and exhibition held at King's College, London, on Friday, 20 March. It was organised by the Industrial Section of The Royal Microscopical Society in collaboration with the Industrial Spectroscopy Group of The Institute of Physics, the Optical Group of The Physical Society and the Physical Methods Group of The Society of Public Analysts and Other Analytical Chemists.

Dr. A. E. J. Vickers, of Thermal Syndicate, Limited, presented a paper on 'The Use of the Polarising Microscope in Organic Chemical and Biological Research' in which he showed how optical measurements can be made with this instrument and how the information can be used for identification purposes and for the elucidation of structure. Typical modern instruments were shown, their features discussed and auxiliary apparatus described. Mr. E. G. Steward (G.E.C. Research Laboratories) gave a paper: 'A Use of the Polarising Microscope in X-ray Analysis.' The polarising microscope, he said, provides a valuable supplement and aid to X-ray analysis in the type of problem frequently encountered in mineral dressing and he described examples to illustrate the ways in which the combination might be employed most effectively in this field. Other papers included: 'Testing Microscopic Objectives with a Sheared-Wave Front Interferometer' by Mr. M. G. L. Curties (C. Baker [Of Holborn]), Ltd.), and 'Polarisation of Fluorescence in Crystals' by Dr. R. Barer (University Museum, Oxford).

Among the exhibits were an infra-red reflecting microscope (Dr. W. C. Price, King's College), an ultra-violet monochromator for use with microscopes (Dr. W. E. Seeds, King's College), an apparatus for fluorescence microscopy (Mr. J. King, Government Laboratory) and a simplified two-circle goniometer (Messrs. W. T. Moore and L. W. Wood, Imperial Chemical Industries, Limited).

London's International Science Centre

Achievements of the Ciba Foundation

NOW entered upon its fourth year, the Ciba Foundation for the Promotion of International Co-operation in Medical and Chemical Research, in its report for 1952, considers the future against a stimulating background of achievement.

The purpose of the foundation was to establish and maintain a centre in London for advancing and promoting the study and general knowledge of, and research in, all branches of the sciences of chemistry, medicine and surgery, and in particular for advancing and promoting international co-operation in medical, chemical, biological and pharmaceutical research and in allied subjects.

From the facts set out in the present report, read in conjunction with previous ones, it is possible to make one or two useful generalisations as to the course which has been followed and as to the probable trend of future policy.

The basic idea, it will be recalled, was to provide accommodation without charge to leading scientists from overseas so that they might meet each other and their English colleagues in an atmosphere conducive to a free exchange of views on their respective subjects. As Lord Beveridge, speaking as one of the trustees, said at the official opening on 22 June 1949 (THE CHEMICAL AGE, **60**, 915), ' . . . This place itself is not a laboratory for mixing compounds, but we do mean to make it a laboratory for "mixing scientists." We want to make it a place where the people who are working on research can meet together to discuss their problems.'

That idea has proved to be right, and as time goes on it has been supplemented and developed in various ways.

Informal Symposia

Provision has been made for informal symposia or colloquia, strictly limited in membership, attended on invitation by leading research workers from different countries, and recorded and published for distribution among their colleagues throughout the world.

Among the Ciba Foundation Conferences in 1952 was one on 'The Chemical Structure of Proteins.'

This, the seventh of the foundation's general symposia and 19th conference in all during a period of three years, was held on the 1 to 3 December 1952. The meeting was unusual in that it was arranged primarily to provide an opportunity for French research workers to play a leading rôle in one of the foundation's conferences.

There were 34 members in all, eight from France, four from Germany, one each from Holland, Sweden and Switzerland, five from the U.S.A. and 14 from various centres in Great Britain.

Brazilian Chemical Imports

A LONG list of chemicals is included among the products which may be imported into Brazil at an official rate under the new law regulating exchange operations which came into effect on 21 February. For imports of essential raw materials, industrial machinery and equipment the official rate has been fixed at 52.41 cruzeiros to £1, but in order to curb inflationary tendencies, licences will only be issued to those who import for re-sale if they undertake to sell within a reasonable margin of profit, to be fixed by CEXIM.

Imports of merchandise not considered to be strictly necessary to the national economy will be paid for at the free rate of exchange. At the time when the new law became effective (that is, 21 February), the free rate of exchange was 100 cruzeiros to £1, but it later rose to 105 cruzeiros and showed a tendency to increase still further.

Chemical imports to Brazil last year were seriously affected by the difficulties of the exchange position as were also exports. However, the new law regulating exchange operations provides that, in the case of certain Brazilian products which cannot be sold abroad at the official rate, fixed percentages of the export bills, ranging from 15 to 50, may be negotiated at the free rate. This means an average reduction of approximately 14 per cent in export prices.

Technologists' Association

SATISFACTORY progress of its activities and general expansion is reported by the Science Technologists' Association now embarking on its fifth year. Inaugurated in July, 1948, at Imperial College, London, in the presence of 154 members representing England, Scotland and Wales, the association now has nearly 1,000 members and eight active branches in London, Edinburgh, Glasgow, Cardiff, St. Andrews—Dundee, Newcastle-on-Tyne, Manchester, and in Ireland.

Work of preparing a central register with details of each member is kept up to date.

Great interest is taken in the education of laboratory technicians and the association has approved a training scheme which is a five-year course of study—three years to a Certificate and a further two years to the Diploma. Its tutorial panel is providing tutors for courses in laboratory techniques to the association's Certificate syllabus and in some cases also to City and Guild courses.

Diploma syllabuses have been prepared in most branches of science and others will be arranged as the demand arises. Certificate examinations will be held in April and those for the Diploma in July this year.

A bulletin is issued to members bi-monthly. Contents include original technical articles, a correspondence column, and a list of situations vacant.

By building up a substantial membership the association hopes to help the technicians to achieve the professional status and official recognition which their ability deserves.

Details of membership may be obtained from the honorary general secretary, the chemistry department, Imperial College, London, S.W.7.

Chemical Companies in U.S.A.

THE number of chemical companies with securities listed on the New York Stock Exchange has increased 70 per cent over the past quarter century, according to a statement made by the Manufacturing Chemists' Association recently.

In 1929, it was stated, there were 49 chemical manufacturing companies with 74 security issues listed on the New York Stock Exchange. By 1939 the number of listed chemical companies had increased to 63 with 89 issues of securities.

By 1952 there were 83 chemical manufacturing companies with 128 separate issues of securities. The growth in chemicals assumes even more significance when it is realised that the total number of all companies listed on the New York Stock Exchange actually declined from 1,419 to 1,288 in the 1929 to 1953 period.

This increase in listed companies has resulted not only from new companies entering the field but also from the growth of a number of small companies seeking funds to finance expansions.

Ramsay Chemical Dinner

AN appeal for £7,000 for the restoration of the pre-war Fellowships to chemical graduates of Glasgow University of the Royal Technical College, for advanced study or for research at another centre, was inaugurated by the Glasgow Committee of the Ramsay Memorial Fellowships Trust at the annual Ramsay Chemical Dinner held in Glasgow on 13 March.

The close association of Sir William Ramsay with Glasgow made it highly desirable that Glasgow graduates should participate in the Fellowship scheme, said Professor J. W. Cook. Since 1922 there had been 14 Fellowships awarded. The Society of Chemical Industry had associated itself with the appeal which had already been sent to all chemical firms in Scotland, continued Professor Cook. One of the first responses had been an offer of £500 from Miss Buchanan, a cousin of Lady Ramsay.

Proposing the toast of 'The Profession of Chemistry,' Sir Edward Appleton said that the strength of a nation could be assessed by its chemical industry. He would like to see more of the best brains diverted to technological aspects rather than to pure science. Those who had a taste for expressing themselves in practical results would find this form of scientific life one of intellectual adventure.

In reply, Dr. A. Fleck, deputy-chairman of Imperial Chemical Industries Ltd., said that out of the £80,000,000 expended on research annually in Britain, between £35,000,000 and £40,000,000 was spent by the chemical industries, which was sufficient evidence that they were fully cognisant of the importance of their rôle in the field of research and its application.

In the Editor's Post

Fuel, Fog & Death

SIR,—I am writing simply to express our appreciation of the article entitled 'Fuel, Fog and Death' in your issue of 14 March. We are grateful that such a journal should express so admirably its views on these matters, and I am hoping that we may be able to refer to the article in an early issue of our own journal *Smokeless Air*.

Yours faithfully,

ARNOLD NASH,
General Secretary.
National Smoke Abatement Society.

Cholorphyll—Green Carbon

SIR,—Whatever chlorophyll does, cannot it be done far better, and much more cheaply, with activated carbon?

Or must we make the carbon green?

Yours faithfully,

R. G. W. FARNELL.
Director, Farnell Carbons Ltd.

Government Policy

SIR,—I read your article on the difficulties of Petrochemicals, Limited, with mixed feelings.

Admiration on the one hand for a firm with sufficient vision to continue with a policy of profound and far reaching importance to this country, in spite of the enormous financial losses involved; and on the other hand depression at this further proof of the inevitable consequences to the chemical industry of government policy in relation to industry in general.

In a recent letter to *Chemistry and Industry* I made the observation that the point had now been reached when there is no longer any incentive to investors to take any risks. The result is that it is extremely difficult and sometimes impossible to raise finance for new products. This means that the sale of any new chemicals introduced to the market are stifled at the very outset for lack of sufficient capital by potential buyers to install the new plant required for the new end products.

One talks glibly about 'The enormous potential demand for ethylene oxide,' 'the vast scope for propylene derivatives,' 'the limitless market for butylene,' and the great potentialities of intermediates such as dichlorodiethyl ether and other products made possible by the availability of these new basic chemicals.

The fact is that Petrochemicals, Limited, and other producers are finding these chemicals difficult to sell. The reasons are obvious. There is no capital forthcoming for the plant installation necessary to convert these chemicals to intermediates and end products, and even the end products, being new, probably require new plant for their incorporation in the finished articles to be used by the consumer.

Thus arises the fundamental difference in outlook between American and British producers. In America they will spend millions on producing commercially a new chemical without the safeguard of a guaranteed market, knowingly and willingly taking the risk because they realise that if the potential demand is there, it will soon be converted into an actual demand. If one attempts to do the same thing in England financial disaster, at least in the early years, is almost inevitable as witness the example of Petrochemicals, Limited.

The only way remaining for new chemicals to be introduced in this country is on the basis of guaranteed contracts which are difficult to obtain, and which limit the scale of operations so that production is uneconomical. It is obvious, therefore, that this kind of fundamental production can only be undertaken by large corporations with sufficient reserves to absorb huge losses, for a period of years, or for the government themselves directly or indirectly, to provide the necessary finance and to be prepared to accept the inevitable losses.

It must be remembered in this connection that the FCIC are not a government body but a corporation financed by the banks and therefore by private investors, and it was quite unfair to finance Petrochemicals in this way and expect a return on investment in the short time they have been operating.

A fundamental change of government policy on the ploughing back of profits into the chemical industry is needed plus such a modification of policy on profits in general

as will make investors feel that a return on capital will be forthcoming commensurate with the risk involved, or failing this the government themselves must be prepared to face the risk of sponsoring work of this nature which is vital for the development of the country's economy.

Without some positive action of this kind there does not seem to be any prospect for the country to do other than continue to rely on American initiative for maintaining our present standards.

Yours faithfully,

A. YARROW.

Director, Leda Chemicals, Ltd.

I.G. Farben Break-up

Details of Division Into Five Companies

DETAILS of the plan made by the Allied High Commission in agreement with the German Federal Government for the distribution of the I.G. Farben chemical trust were announced in Bonn on 20 March.

Five companies—three major and two minor—have been created out of the all-powerful I.G. Farben combine, a recent assessment of which appeared in THE CHEMICAL AGE (**68**, 343).

As 'a dangerous concentration of economic power,' I.G. Farben came automatically under the Allied decartelisation legislation, and it was originally intended to split the trust, first into about 80 and then 40 companies, but this was found to be impracticable for both technical and administrative reasons.

Assets of the old I.G. Farben will be divided among the successor companies as follows:—

Farbenfabriken Bayer A.G., with a main plant in Leverkusen and four other plants, will have a share capital of DM.387,600,000 (£33,000,000).

Badische Anilin-und Soda-Fabrik A.G. has a main plant, Ludwigschafen, and another in Herne (Sodingen). Share capital will be DM.340,000,000 (£29,000,000).

Farbwerke Höchst has its main works at Höchst, and, with three other plants, will have a share capital of DM.285,600,000 (£24,300,000).

These three major companies also have a 30 per cent participation each in the copper-smelting plant of Duisburger Kuperfutte.

The smaller companies are:—

Cassella Farbwerke Mainkur A.G. which is already established and was released from Allied control at the end of 1952, and has a share capital of DM.34,100,000 (£3,000,000).

Chemische Werke Hüls GmbH, of which the share capital has still to be fixed.

As the capital of I.G. Farben was in pre-war Reichmarks 1,360,000, a shareholder will be entitled to receive for each 1,000 Reichmark share:—

In Farbenfabriken Bayer D.M.285; Badische Anilin-und Soda-Fabrik A.G., 250; Farbwerke Höchst, 210; and in the Cassella Company, 25. Shareholders will also receive a share in the new Hüls company estimated at D.M.60 and a share in the Rheinstahl Steel Works of the nominal value of D.M.50.

For a pre-war 1,000 Reichmark share of I.G. Farben, shareholders will therefore receive shares to the approximate value of D.M.900 in the new companies.

The Allied regulation provides for the protection of pension rights.

Optimism in Plastics

WHILE the exports of British plastics materials in 1952 at £13,500,000 were higher than in 1950 (at £9,000,000) they were well below the 1951 figure of £16,250,000. These figures were given at the annual general meeting of the British Plastics Federation in London on 18 March by the chairman of the Federation, Mr. C. S. Dingley.

Mr. Dingley said: 'There is a compensating factor in increasing consumption throughout the world and there is the bright side. Trade with Australia is improving, export business is bucking-up, new materials are coming along in our industry with uses for which the possibilities may be beyond our present conception.'

He added that standardisation had made steady progress during the year and that it was expected that specifications for polythene tubes for cold-water services and domestic food services would be published in the course of the next two or three months.

Mr. Dingley was re-elected chairman of the Federation and Mr. A. E. Skan was re-elected vice-chairman.

The Chemist's Bookshelf

ANNUAL REVIEW OF NUCLEAR SCIENCE. Vol. 2. 1953. Annual Reviews, Inc., Stanford, California. Distributed by H. K. Lewis & Co., Ltd., London. Pp. vii + 429. $6.00.

Although at first sight there is perhaps less of direct interest to the chemist in this volume than in Volume 1, and considerably less than there promises to be in Volume 3, some of the reviews have much general interest, and at least two have a more particular bearing on problems which some chemists (or, in one case, chemical engineers) may have to solve.

The reviews which might be mentioned specifically for the chemist are those on the origin and abundance of the elements, the production and distribution of natural radio-carbon, radiation effects in solids and isotopes. The last of these is specifically directed towards the general chemistry of isotopes—that is, those properties of the elements which are affected by nuclear mass.

If the other chapters are of more direct value to physicists, the reader with wide interests will find much food for thought in the reviews on energy production in stars, subnuclear particles, and the origin and propagation of cosmic rays. In all, sixteen topics have been chosen for this volume. The standard of readability is high, and the literature cited appears to be comprehensive. —C.L.W.

FERROUS ANALYSIS. By E. C. Pigott. 2nd. revised edition. Chapman and Hall, London. 1953. Pp. xxvii + 690. 84s.

The stated purpose of the book is the same as the first edition published in 1942 under the title 'The Chemical Analysis of Ferrous Alloys and Foundry Materials.' The author has aimed at conforming to practical requirements by providing methods that will fall within the scope of the average laboratory and that are reliably selective and accurate, rapid and economical and of general application. Let it be said right away that the author has succeeded in his aim, and for that reason the book should be accorded the same welcome as the first edition.

The book is divided into five major sections:— analytical techniques (including photoelectric absorptiometry, spectrographic procedure and the use of organic reagents in ferrous analysis—58 pages), the constituents of iron and steel (arranged alphabetically—484 pages). The microchemical analysis of iron and steel (29 pages), the analysis of alloys and ores (30 pages) and the analysis of refractory materials (29 pages).

In addition there are numerous tables and, what is without doubt the most striking feature of the book, an extensive bibliography.

How much better this book could have been had the author not attempted to do so much! In the reviewer's opinion the inclusion of the detailed chemical reactions of each element is quite unnecessary, for these can be found in any text book of inorganic chemistry and are not relevant in a book of this type. Many photographs could have been omitted as they have been taken directly from manufacturers' catalogues. For example, the damsel in Fig 1 (facing p. 16) might well be standing in front of the latest in American cooking ranges rather than a quantometer. It must be remembered that photographs add considerably to the cost of a book and this book is by no means inexpensive. Line diagrams would have been more informative in many instances.

Although the author has in general been most thorough in his arduous compilation he would have done better to omit his eight pages on organic reagents or to have them proofed by an organic chemist. This is by far the worst chapter in the book and is full of glaring inaccuracies. Thus, cupferron is not amino-nitroso-phenylhydroxylamine nor has pyridine ever been used by itself as a reagent for iron, etc. What are the positions of the bromine atoms and hydroxy group in dibromohydroxy-quinoline, and to which

of the benzoin-oximes is the author referring? Chromatropic acid presumably is chromotropic acid, and dithiol is perhaps meant to be toluene-3, 4-dithiol. Resorcinol is spelled resorsinol, and diphenyline appears as diphenylene. The latter compound is not a sensitive test for tungsten as the author states, although this error is partially forgivable in that the original paper also makes this claim. But it does at least show that the author has not had first-hand experience of the method. The most comprehensive collected information on organic reagents is found in the Welcher manual, yet there is no mention of this valuable work in the organic reagent bibliography.

There is no reference to recent exhaustive studies on that useful titrant mercurous nitrate, a serious omission, especially as the authors refers to the incomplete work of Bradbury and Edwards in this field.

The author has shown unusual skill in blending the mass of material at his disposal and has succeeded in producing a beautifully written text. The book is much more than a cookery book, a notable and very useful feature being the inclusion of the detailed theory of all the methods used in ferrous analysis.

The book is a font of information for most workers in the field of ferrous analysis, and quite the best of its kind.—A. J. NUTTEN.

CHEMISCHE TECHNOLOGIE. Edited by Karl Winnacker and Ernst Weingaertner. Volume V: Metallurgie und Allgemeines. Carl Hanser Verlag, Munich. 1953. Pp. xxvii + 846 with 311 illustrations and 117 tables. Boards. DM. 71.50, Cloth DM. 74.50.

Volumes I, II and III have already been reviewed in these columns. The work will be completed in the autumn with the publication of Volume IV. A discount of 10 per cent is offered on volumes ordered before this; the total cost of the set is then about DM. 280.

Volume V is devoted mainly to metallurgy but also contains several chapters on topics of general interest. The section on metallurgy opens with a discussion of the occurrence and relative abundance of metals, and with a general account of the methods used for their extraction. This is followed by a chapter on mineral dressing which includes an excellent, authoritative account of flotation. The rest of this section deals with the metallurgy of individual metals, beginning with a well documented account of the alkali metals. Magnesium is discussed in a separate chapter which includes detailed accounts of both the electrolytic and thermal processes for its extraction and a section on magnesium alloys. The next two articles are devoted to calcium and aluminium, special attention being paid to the recovery of the latter from scrap. Copper, nickel, cobalt, lead, zinc, cadmium, antimony, bismuth, mercury, indium and thallium are dealt with in a single chapter which unfortunately contains very few references to the literature. Ferrous metallurgy is discussed in detail, and the chapter on steel and its constituents includes accounts of the metal carbides and of powder metallurgy. Further sections deal with the noble metals and with some of the rare metals. The first part of the volume concludes with a useful discussion of corrosion and its prevention.

The second part of the volume is devoted to general topics. It begins with an account of gauges and regulators, and a discussion of power, steam and refrigeration problems. One of the best chapters in the book is that which deals with the fundamental considerations underlying the planning of a chemical works. The chapter on safety precautions is mainly concerned with the legal aspects of this subject and will thus be of little use to readers outside Germany. The book concludes with an article on German patent law.

This is an excellent comprehensive textbook and it is unfortunate that language difficulties will prevent most undergraduates from making use of it. However it should be of value as a reference book as the material is made readily accessible by a good index and by the extensive use of subheadings and tables. Numerous references to the original literature are given in all but a few of the chapters.—P.S.

Lead Vein Struck

Derbyshire miners have struck a vein of lead which may be one of the richest finds made in the area for many years. It is the result of two years' geological survey, test borings, and six months' blasting. The strike has been made by Matlock Lead Mines Ltd. As well as the lead, the vein contains fluor spa, and it is expected barytes will be found and zinc as well.

HOME

Selling Taken Over

Monsanto Chemicals Ltd. and the Midland Tar Distillers Ltd. jointly announce that due to good progress with the building of a tar acids refinery at Four Ashes, near Wolverhampton, the Midland Tar Distillers will take over from Monsanto the selling and sales service of ortho-cresol and all grades of cresylic acid as from 1 April and natural phenol on 1 July. It will be recalled that in October, 1951 it was announced by the two companies that the Midland Tar Distillers Ltd. was building the refinery and would in due course take over from Monsanto the refining of its acids and the selling of the resultant products.

Effluent Disposal

A symposium on effluent disposal will be held in the large chemistry theatre at University College, Gower Street, London, W.C.1, on Friday, 17 April, by the Graduates' and Students' Section of the Institution of Chemical Engineers. Papers will be read by Dr. B. A. Southgate, Director of Water Pollution Research, DSIR; H. Cary Gibson, Director, Freshwater Biological Association, Windmere Laboratory; C. D. Mulvey, secretary, Anglers' Co-operative Association; J. I. Spicer, Chief Pollution and Fisheries Officer, Trent River Board; and representatives from I.C.I., Dorr-Oliver & Co., W. C. Holmes, Ltd., Harwell, and the British Electricity Authority.

Iron & Steel Prices Increased

Following the recommendation made last month by the Iron and Steel Corporation of Great Britain that, because of the rise in the price of coal, the prices of iron and steel should be increased, an order to that effect has been authorised by the Minister of Supply, Mr. Duncan Sandys. Copies of the Order (The Iron and Steel Prices No. 2 Order, 1953) which came into operation on 14 March, and raises the maximum prices by an average of between 1 and 1½ per cent, may be obtained from HMSO. The Deposited Schedules to the Order may be inspected at the offices of any of the Regional Controllers of the Ministry of Supply or at the offices of the Iron and Steel Corporation of Great Britain.

KID Exemptions

Two further chemicals, N-*m*-ethylaniline and sodium trichloroacetate have been added to the list of synthetic organic chemicals, analytical reagents, other fine chemicals and chemicals manufactured by fermentation processes exempted from Key Industry Duty under Section 10(5) of the Finance Act. These additions will be exempt for the period from 23 March to 18 August, 1953 under the Safeguarding of Industries (Exemption) (No. 2) Order, 1953, published as Statutory Instruments 1953, No. 438. (HMSO, price 2d.)

Change of Address

Since 21 March the General Asphalte Co. Ltd. has been located at Grafton Road, London, N.W.5. The telephone number is Gulliver 7171/8 and the telegraphic address: Genashphalt Norwest London.

Welding Instruction Courses

The next courses for welding engineers, supervisors, inspectors and foremen organised by the Quasi-Arc Co., Ltd., will be held at Bilston, Staffordshire, beginning on 13 July and 5 October. Each course is of three weeks' duration and about half the time is allotted to technical and theoretical work and half to practical welding experience. Full particulars and applications for enrolment should be sent to the Quasi-Arc Co., Ltd., Bilston, Staffordshire, or Bridgewater House, Cleveland Row, St. James's, London, S.W.1.

Distillers Company Organisation

Reorganisation of the activities in its industrial group 'with a view to unifying administration' is announced by the directors of the Distillers Company Ltd. Control will eventually be carried out through operating divisions, thus permitting the liquidation of most of the industrial subsidiaries, which number about 80. The first phase of this reorganisation, which it is understood has been under consideration for some time, will become effective as from 1 April. Originally formed in 1877 to take over six Scottish distilleries, the company now has widespread industrial interests.

• OVERSEAS •

New European Address

Effective 4 May, the new address of Union Carbide Europa S.A. will be 1-3 rue de Chantepoulet, Geneva, Switzerland. The telephone number will be (022) 26515 and the telegraphic address: Unicarb.

Gypsum Deposits Detected

Large gypsum deposits have been detected in the Negev area of Israel. Test consignments of Negev copper have been sent to Belgium and the United States for experimental refining. New nitrate deposits have been detected in the Judean hills, and new iron deposits found at Wadi Siraffi. Cement production for 1952 amounted to 445,000 tons, an increase of 6,000 tons over the previous year.

Nitrogen Production in Portugal

The nitrogen factories opened in Portugal last year are already producing about 50 per cent of the country's requirements of sulphate of ammonia and should shortly be in a position to supply the whole of the calcium cyanamide needed. In 1952 production of sulphate amounted to 45,000 tons, worth 100m. escudos.

Nationalisation Threat

The Chilean Government signed a decree on 19 March which will enable it to take complete control of any nitrate plant at which work may become paralysed if the President considers that the stoppage might cause economic or social unrest. The law is said to be aimed against the Tarapaca and Antofagasta Nitrate Company which has been seeking tax relief in order to continue operating.

Big Contract Awarded

Standard Oil Company of California has awarded The M. W. Kellogg Company, subsidiary of Pullman Incorporated, the contract for a duplicate of the world's largest vacuum flasher. The unit, which will have a capacity of 55,000 barrels of reduced crude daily, equals in capacity a similar plant Kellogg designed and erected for this company over a year ago at its Richmond (Cal.) refinery. As part of a major refinery improvement programme at El Segundo (Cal.), the vacuum flasher is scheduled to be under construction by July.

Canadian Synthetic Rubber

Exports of synthetic rubber by the Polymer Corporation have reached $20,000,000 a year. In addition half the primary rubber consumed in Canada is now supplied by the Government-owned synthetic plant at Sarnia, Ont. Mr. C. D. Howe, Minister of Defence Production, presenting the annual report of the corporation, said that production and sales were a record. Profits, before the payment of $3,000,000 income tax, were, however, 8 per cent less than 1951 because of the lower prices of standard grades of rubber, lower sales and higher wages.

Caprolactam in U.S.A.

PLANS for a new plant to be built by Mathieson Chemical Corporation at Morgantown, West Virginia, to produce caprolactam, a raw material to be used in the production of nylon fibre, were jointly announced on 25 February by Mathieson and American Enka Corporation.

The new plant is expected to be the first in the chemical industry to produce commercial quantities of caprolactam and will provide a source of raw material for American Enka in the manufacture of nylon. American Enka was recently licensed to produce nylon under du Pont patents and is building a new nylon fibre plant adjacent to its rayon yarn factory at Enka, North Carolina.

Mathieson's caprolactam plant is based upon a process developed by its own research and engineering division. Mathieson emphasised that it intends to confine its activities to the production of monomers and will not go into production of fibre. Morgantown was chosen as the site for the plant because of its natural geographic location and the availability of raw materials.

Algemene Kunstzidjde, N.V., of Arnhem, Holland, a foreign affiliate of American Enka has been manufacturing nylon from caprolactam at a plant at Emmen, Holland. Although American Enka will be licensed and will pay royalties to the du Pont company, it will utilise the technical experience of its Dutch affiliate.

• PERSONAL •

One of the appointments announced at the meeting of the Council of Leeds University on 18 March, was that of DR. G. DIXON-LEWIS, as research chemist in the Department of Coal Gas and Fuel.

Among the 25 new Fellows elected at the annual meeting of the Royal Society held at Burlington House, London, on 19 March, were the following:—

JOHN STUART ANDERSON, Deputy Chief Scientific Officer, Atomic Energy Research Establishment, Harwell. Distinguished for his contributions to inorganic chemistry, particularly in connection with the chemistry of the metal carbonyls, complex salts, and non-stoichiometric compounds.

KENNETH BAILEY, Assistant Director of Research in the Department of Biochemistry and Fellow of Trinity College, Cambridge. Distinguished for his biochemical researches on the proteins of muscle.

JOHN WARCUP CORNFORTH, Research Chemist, National Institute for Medical Research. Distinguished for his fundamental contributions to the chemistry of penicillin and its degradation products and to the chemistry of the oxazole group, and for the total synthesis of the androgenic hormones.

ERNEST FREDERICK GALE, Reader in Chemical Microbiology, Cambridge. Distinguished especially for his work on the amino-acid metabolism of bacteria.

ALFRED GORDON GAYDON, Warren Research Fellow, Imperial College of Science and Technology, London. Distinguished for his researches on the spectra of flames, which have gone far in elucidating the mechanism of flame reactions.

ALAN RICHARD POWELL, research manager, Johnson Matthey & Co., Ltd. Distinguished for his contribution to analytical chemistry and the chemistry and metallurgy of the rarer metals, which has led to important developments in methods for the extraction of platinum ores and the production of very pure metals.

HERBERT MARCUS POWELL, Reader in Chemical Crystallography, Oxford. Distinguished for his elucidation of problems of chemical constitution by X-ray methods, especially of organo-metallic and clathrate compounds.

THOMAS WALLACE, C.B.E., Professor of Horticultural Chemistry, Bristol University; Director, Horticultural Research Station, Long Ashton. Distinguished for his studies of mineral nutrition of horticultural crops.

DR. J. T. EDWARD, senior lecturer in Chemistry at Trinity College, Dublin, was married on 21 March to Miss D. Waldron, of King's Norton.

Dr. Edward, who is a Canadian, went to Birmingham University Chemistry Department with an I.C.I. Fellowship about three years ago and left last September to take up his appointment in Dublin. Miss Waldron, who is engaged on cancer research at Birmingham Medical School, graduated in Chemistry at Birmingham University, and is preparing her thesis for the Doctor of Philosophy degree. Dr. Edward is on THE CHEMICAL AGE panel of book reviewers and we are sure that readers will join with us in wishing both Dr. and Mrs. Edward all good wishes for the future.

Obituary

It is with regret that we announce that MR. FRANCIS WILLIAM LEWIS, a director of A. Boake, Roberts & Company, Ltd., died on 15 March, after almost 60 years' service with the company. After some years' experience in a City broker's office, Mr. Lewis joined the company on 20 November, 1894, and became a director in September, 1921.

It was under his guidance that the company commenced the manufacture of fine chemicals and he was intimately concerned in the development of the business until the onset of his illness last November.

He was widely travelled and had many friends in the industries and associations that the company serve. All who knew him were attracted by his enthusiasm and integrity. His colleagues, some of whom had worked with him for forty-five to fifty years, knew him as a man of great kindness, sober wisdom and wide experience.

Publications & Announcements

A FILM made expressly for analytical chemists, 'The Technique of Sampling' has been added to the film library of Imperial Chemical Industries Ltd., Imperial Chemical House, Millbank, London, S.W.1. The catalogue number is R.11, the running time 30 minutes, and the size 16mm. A black and white film, it shows some of the sampling methods used by I.C.I. and demonstrates simply the principles involved. Nitrate of soda, limestone, coal and the aseptic sampling of penicillin are dealt with fairly fully. Illustrated in less detail are sampling methods used for cotton fabric and leathercloth, sodium and ammonia. Of special interest is a sequence showing the sampling and testing of the atmosphere in a confined space to ensure that it is free from dangerous fumes.

* * *

A WIDE range of literature is published by the Petroleum Information Bureau, 23 New Bond Street, London, W.1, and is available, free of charge, to all those interested in petroleum products. The literature seeks to explain in non-technical language what is involved in the search for crude oil, its production, transportation and refining. In addition, sets of three 40 in. by 30 in. two-colour wall charts—'Searching for Oil,' 'Drilling for Oil' and 'Refining of Oil'—may be had for 4s. 6d. per set. A map of the world's oil-producing areas and refining centres with relevant statistics are obtainable, 2s. post free. Five film strips and 180 sound and silent films can be had on free loan as can episcope photographs and lantern slides, sets of samples, molecular models and display material. None of the literature or visual aids carry advertising matter.

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ANOTHER new title has been added to the series of technical manuals which was recently launched by the Vacuum Oil Company. The latest addition is devoted to gears, and gives a brief account of the many different types in use today in industry and transport. 'Gear Lubrication,' like earlier manuals in this series, is directed not so much to the gear designer as to the operator. The principles of tooth action are described, and the various types of gear in common use are discussed and illustrated. As a special feature of a book intended to be of practical value to the operator, the causes of failure are dealt with in unusual detail and kinds of damage likely to be encountered with gears that are incorrectly operated are indicated. The principles of lubrication as applied to gears are described, and a list of recommended oils is given. The book concludes with a glossary of technical terms commonly used in dealing with gears. 'Gear Lubrication,' measuring 8½ in. by 11 in., contains 60 pages. There are almost 100 diagrams, many of them in two colours. This book is available without charge upon request to the Vacuum Oil Company, Caxton House, Tothill Street, London, S.W.1, or from any of the company's branches throughout the country.

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CHEMICAL, physical and counting properties of diamonds, crystallography, ruling diffraction gratings, and synthetic diamonds and diamond substitutes are all dealt with under the scientific aspects in the survey of the diamond tool industry in 1952 published by the Industrial Diamond Information Bureau. The chemical properties section reports that H. J. Grenville-Wells heated diamond in vacuum to about 2,000° C. until they were wholly or partially converted to graphite. The orientation was subsequently determined by X-rays. Extensive investigations on the oxidation of boart were carried out under various conditions at the Diamond Research Laboratory. One result was that diamonds larger than $-10+14$ mesh showed practically no oxidation or loss when heated to 500° C. for up to three hours. Copies of the survey, which gives 139 references to other sources of information, are available from the Industrial Diamond Information Bureau, 32-34 Holborn Viaduct, London, E.C.1.

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SOLE selling and manufacturing rights of the range of Spa Hot Forged Steel Unions, formerly marketed by Steam Plant Accessories Ltd., has now been taken over by Shay Products Ltd., of 17 Little St. Leonards, Mortlake, London, S.W.14, to which all further inquiries and orders should be addressed. Manufacture will be continued by J. E. Shay Ltd., of Basingstoke, Hampshire, which is an associate of the company.

British Chemical Prices

LONDON.—The activity in the chemicals market has remained good with the seasonal demand for fertilisers being well above average. Most of the industrial chemicals continue to move in fair quantities and inquiries for new business have been reported as satisfactory. There have been no outstanding price changes on the home market, but quotations for export are keener. Conditions in the coal tar products market remain unchanged, and there has not yet been sufficient time to know the effect of the substantial reduction in the price of A.D.F. cresylic acid.

GLASGOW.—Trade during the past week in general chemicals has been steady with little or no change either way. It is pleasing to note that an increased demand is being experienced from certain sections of the textile industry. There is little change to report on the export side.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £90 ; 80% pure, 10 tons, £94 ; commercial glacial 10 tons, £98 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £149 per ton.

Acetone.—Small lots : 5 gal. drums, £143 per ton ; 10 gal. drums, £125 per ton. In 40/50 gal. drums less than 1 ton, £105 per ton ; 1 to 9 tons, £104 per ton ; 10 to 49 tons, to £103 per ton ; 50 tons and over, £102 per ton.

Alcohol, Industrial Absolute.—300,000 gal. lots. d/d. 3s. 7½d. per proof gallon ; 100,000 and less than 200,000 gal. lots, d/d, 3s. 8½d. per proof gal.

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

Allyl Alcohol.—Less than 40 gals., 3s. 10½d. per lb. ; 40 gal., 3s. 6½d. per lb. ; 2 to 5 40 gal. drums, 3s. 4½d. per lb. ; 1 ton and over, 3s. 2½d. per lb.

Alum.—Ground, £24 per ton, f.o.r. MANCHESTER : Ground, £25.

Aluminium Sulphate.—Ex works, £12 per ton d/d. MANCHESTER : £14 to £15.

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

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £47 per ton.

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

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

Ammonium Persulphate. — MANCHESTER : £6 2s. 6d. per cwt. d/d.

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

Antimony Sulphide.—Golden, d/d in 5 cwt. lots as to grade, etc., 2s. 3¼d. to 3s. 1½d. per lb. Crimson, 3s. 4¼d. to 4s. 5¼d. per lb.

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

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

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

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

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

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid: Anhydrous, £59 10s. ; in 1-cwt. bags; commercial, granular, £39 10s. ; crystal, £42 ; powder, £43 ; extra fine powder, £44 ; B.P., granular, £48 10s. ; crystal, £51 ; powder, £52 ; extra fine powder £53.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid : Commercial, granular, £68 ; crystal, £76 ; powder, £73 10s. ; extra fine powder, £75 10s. ; B.P., granular, £81 ; crystal, £88 ; powder, £85 10s. ; extra fine powder, £87 10s.

Butyl Acetate BSS.—£181 per ton, in 20-ton lots.

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

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

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

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

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chromic Acid.—2s. 0½d. to 2s. 0¾d. per lb., less 2½%, d/d U.K.

Citric Acid.—1 cwt. lots, 201s. cwt. ; 5 cwt. lots, 196s. cwt.

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

Copper Carbonate.—MANCHESTER : 2s. 7d. per lb.

Copper Sulphate.—£87 10s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £11 2s. d/d.

Ethyl Acetate,—20 tons and upwards, d/d, £151 per ton.

Formaldehyde.—£35 10s. per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £82 5s. in 4-ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1.260 S.G. £14 19s. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hydrochloric Acid.—Spot, 12s. to 16s. per carboy d/d, according to purity, strength and locality.

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

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

Iodine.—Resublimed B.P., 19s. 10d. per lb. in 28 lb. lots.

Iodoform.—30s. per lb. in 28 lb. lots.

Lactic Acid.—Pale tech., 44 per cent by weight £122 per ton ; dark tech., 44 per cent by weight £67 per ton ex works one ton lots ; dark chemical quality 44 per cent by weight £102 per ton, ex works ; Usual container terms.

Lead Acetate.—White : £137 10s. per ton.

Lead Nitrate.—£105 per ton.

Lead, Red.—Basis prices per ton. Genuine dry red lead, £123 10s. ; orange lead, £135 10s. Ground in oil : red, £150 ; orange, £162.

Lead, White.—Basis prices : Dry English, in 5-cwt. casks, £139 10s. per ton. Ground in oil : English, under 2 tons, £160 10s.

Lime Acetate.—Brown, ton lots, d/d, £30 to £34 per ton ; grey, 80-82%, ton lots, d/d, £34 to £39 per ton.

Litharge.—123s. 10d. per cwt. in 5-ton lots.

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

Magnesium Carbonate.—Light, commercial, d/d, £87 15s. ; cwt. lots £97 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £240 ; cwt. lots £250 per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—19s. 3d. per lb. in 28 lb. lots ; smaller quantities dearer.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

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

Methylated Spirit.—Industrial 66° O.P. 100 gals., 6s. 4½d. per gal. ; pyridinised 64° O.P. 100 gal., 6s. 6d. per gal.

Methyl Ethyl Ketone.—5 gal. drums, £183 per ton ; in 40-45 gal. drums, less than 1 ton, £153 per ton ; 50 to 100 tons, £150 per ton ; 100 tons and over, £149 per ton.

Methyl *iso*Butyl Ketone.—5 gal. drums, £203 per ton in 40-45 gal. drums, less than 1 ton, £173 per ton ; 1 to 10 tons, £172 per ton ; 10 to 50 tons, £171 per ton ; 50 to 100 tons, £170 per ton ; 100 tons and over, £169 per ton.

Nickel Sulphate.—D/d. buyers U.K. £140 10s. per ton. Nominal.

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

Oxalic Acid.—Home manufacture, £170 per ton ; foreign manufacture £137 10s. per ton.

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

Potash, Caustic.—Solid, £98 10s. per ton for 1-ton lots ; Liquid, £37 15s.

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

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

Potassium Chloride.—Industrial, 96%, 6-ton lots, £20 to £22 per ton.

Potassium Iodide.—B.P., 17s. 10d. per lb. in 28 lb. lots ; 17s. 4d. in cwt. lots.

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

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

***iso*Propyl Alcohol.**—Small lots : 5 gal. drums, £156 per ton ; 10 gal. drums, £146 per ton ; in 40-45 gal. drums : less than 1 ton, £126 per ton ; 1 to 9 tons, £125 per ton ; 10 to 50 tons, £124 per ton ; 50 to 100 tons, £123 per ton ; 100 tons and over, £122 per ton.

Salammoniac.—Dog-tooth crystals, £72 10s. per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

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

Soda Ash.—58% ex depôt or d/d, London station, £9 10s. to £14 10s. per ton.

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

Sodium Acetate.—£85 to £91 per ton d/d.

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

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

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£87 to £95 per ton.

Sodium Cyanide.—100% basis, 8d. to 9d. per lb.

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

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

Sodium Iodide.—B.P., 19s. 4d. per lb. in 28 lb. lots.

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

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

Sodium Nitrate.—Chilean Industrial, 97-98%, 6-ton lots, d/d station, £29 15s. per ton.

Sodium Nitrite.—£31 for 1 ton lots.

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

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

Sodium Prussiate.—10d. to 10½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber's Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £7 per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot. £30 2s. 6d. per ton, d/d, in drums; broken, £31 12s. 6d. per ton, d/d, in drums.

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

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

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

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

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d ; white seal, £112 10s. ; green seal, £111 10s. ; red seal, £110.

Rubber Chemicals

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

Carbon Bisulphide.—£65 5s. per ton, according to quality.

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

Carbon Tetrachloride.—£74 10s. per ton.

India-rubber Substitutes.—White, 1s. 6¾d. to 1s. 10½d. per lb. ; dark, 1s. 4½d. to 1s. 8½d. per lb.

Lithopone.—30%, £50 per ton.

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

Mineral Rubber, 'Rupron.'—£20 per ton.

Sulphur Chloride.—British, £55 per ton.

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

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

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £16 18s.

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

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

Sodium Nitrate.—Chilean agricultural for 6-ton lots d/d nearest station, £28 15s. per ton.

Coal-Tar Products

Benzole.—Per gal, ex works : 90's, 3s. 8½d. ; pure, 3s. 11½d. ; nitration grade, 4s. 2½d.

Carbolic Acid.—Crystals, 1s. 6d. to 1s. 8d. per lb. Crude, 60's, 8s. MANCHESTER : Crystals, 1s. 6d. to 1s. 8d. per lb., d/d crude, 8s. naked, at works.

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

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

Naphtha.—Solvent, 90/160°, 4s. 10½d. per gal. for 1000-gal. lots ; heavy, 90/190°, 4s. 3½d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, ton lots, in sellers' bags, £18 16s. 3d. to £34 per ton according to m.p. ; hot-pressed, £50 to £60 per ton, in bulk ex works ; purified crystals, £68 10s. to £79 3s. 4d. per ton.

Pitch.—Medium, soft, home trade, 130s. per ton f.o.r. suppliers' works ; export trade, 200s. per ton f.o.b. suppliers' port. MANCHESTER : £8 f.o.r.

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

Toluol.—Nitration grade, 5s. 3d. per gal. MANCHESTER : Pure, 4s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 6d. per gal., according to grade, d/d.

Intermediate and Dyes
(Prices Nominal)

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

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

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

Dichloraniline.—2s. 8½d. per lb.

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

Dinitrotoluene.—S.P. 15° C., 1s. 11½d. per lb. ; S.P. 26° C., 1s. 3d. per lb. S.P. 33°C., 1s. 1½d. per lb. ; S.P. 66/68°C., 2s. per lb.

***p*-Nitraniline.**—4s. 5½d. per lb.

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

Nitronaphthalene.—2s. per lb.

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

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

***m*-Xylidine Acetate.**—4s. 5d. per lb., 100%.

Next Week's Events

MONDAY 30 MARCH

Society of Chemical Industry

Leeds: The University, 7 p.m. Yorkshire Section, annual general meeting.

Oil & Colour Chemists' Association

London: The Borough Polytechnic, S.E.1, 2.30 p.m. Opening of the 5th Technical Trade Exhibition (until 1 April), preceded by official luncheon at the Criterion Restaurant, Piccadilly Circus, 12.30 p.m.

TUESDAY 31 MARCH

Chemical Engineering Group (SCI)

London: Burlington House, Piccadilly, W.1, 5.30 p.m. W. G. Daroux: 'The Production of Acetic Anhydride from Acetone.'

Institute of Metals

Oxford: Black Hall, St. Giles, 7 p.m. Annual general meeting of the Oxford Local Section, followed by open discussion.

Society of Instrument Technology

London: Manson House, Portland Place, W.1, 6.30 p.m. Joint meeting with the Control Section. Dr. G. L. d'Ombrain: 'The Presentation of Control Theory and the Training of Control Engineers.'

WEDNESDAY 1 APRIL

Society of Public Analysts

London: Burlington House, Piccadilly, W.1, 7 p.m. Discussion: 'The Determination of Small Amounts of Lead in Foods and Biological Materials.'

Institute of Fuel

Burnley: Central Library, 7 p.m. Joint meeting with the National Smoke Abatement Society. S. N. Duguid (Powell Duffryn Technical Services Ltd.): 'Let There Be Light.'

THURSDAY 2 APRIL

Institute of Metals

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. Annual general meeting of the Birmingham Local Section, and chairman's address.

London: 4 Grosvenor Gardens, S.W.1, 7 p.m. Annual general meeting of the London Local Section, followed by open discussion.

Leeds Metallurgical Society

Leeds: The University, 7.15 p.m. J. W. Cuthbertson: 'Recent Advances in Electrodeposition of Metals and Alloys.'

Ethyl Malonate

Preparation for Cyanoacetamide

A METHOD for preparing ethyl malonate from cyanoacetamide is outlined in a communication which we have received from Dr. M. A. Phillips. The method, which was developed in the Research Laboratories of Dr. M. A. Phillips and Associates, Romford, Essex, may serve to utilise excess stocks of cyanoacetamide and particularly to use otherwise waste material from crystallisation mother liquors which are too highly coloured to be of any value.

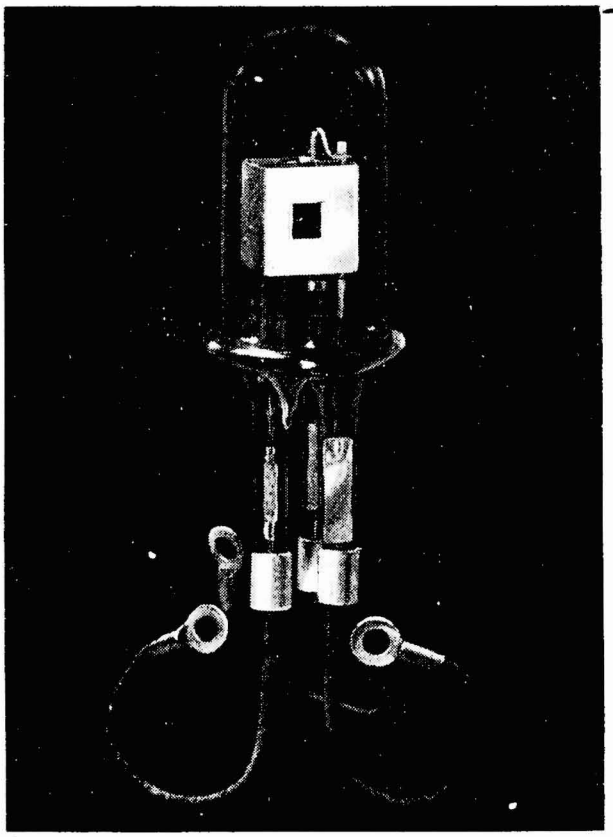
Crude amide (200 g.) is mixed with water (150 c.c.) and 400 c.c. of a previously mixed and cooled solution of concentrated sulphuric acid (s.g. 1.84; 425 c.c.) in 96 per cent alcohol (500 c.c.) is then added to the amide solution gradually with stirring, maintaining the temperature between 46° and 52° which necessitates cooling. After addition is complete, the temperature is raised to about 75° when a reaction begins; this is allowed to moderate after which the mixture is refluxed for 1½ hours.

Benzene (350 c.c.) is now added and water is removed by azeotropic distillation using a short ring-packed column and an automatic separator which returns the lower alcohol/benzene mixture to the still and runs the water layer to waste. After about six hours, no further water separates and the first stage reaction is over. Isolation of the ester at this point shows a yield of about 90 per cent of mixed ethyl cyanoacetate and ethyl malonate containing about 30 per cent of the latter.

To obtain pure ethyl malonate, the rest of the alcoholic sulphuric acid is now added, followed by 96 per cent alcohol (150 c.c.) and the mixture is refluxed for a further 4½ hours. The alcohol is removed by distillation, water is added and the ester isolated in benzene and in the usual manner. Removal of benzene followed by distillation under reduced pressure gives a yield of 280 g. of ethyl malonate containing practically no ethyl cyanoacetate. This is 74 per cent of that theoretically possible.

U.K. Chemicals Overseas

Exports of chemicals, drugs, dyes and colours from the United Kingdom in February were valued at £9,817,730. This was £3,224,028 less than the same month of 1952.



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Features

- ★ All-silica construction, including seals.
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Chemical & Allied Stocks & Shares

A NUMBER of factors have combined to maintain a cheerful and rising trend in stock markets, where War Loan 3½ per cent at 80 1/16 touched its highest level for over a year and industrial shares were influenced by dividend increases from a number of important companies. Sentiment has been governed mainly by the confident belief that for once in a while the Budget will bring lower, and not higher, taxation. The scope for tax concessions is admittedly small and will apparently be determined by the extent to which the Chancellor can reduce Government expenditure and whether he expects revenue to increase in the coming financial year. Nevertheless, the City is inclined to the optimistic view that it may be possible to take 6d. off the standard rate of income tax, also modify EPL and perhaps give tax concessions of some kind in respect of profits earned overseas as a help to export trade.

Shares of chemical and kindred companies have been firmer, but have not shown much response to the surrounding rise in stock markets. This is because it is recognised that some sections of the industry will have to report a sharp decline in profits from the record levels reached in some cases in 1951 when inflationary trends were reflected in company earnings generally. Imperial Chemical have been active round 48s. The City view is that although profits for 1952 will be below the peak reached in 1951, the directors might feel disposed to follow a somewhat more liberal dividend policy and pay out slightly more than the 13 per cent paid for 1951.

Albright & Wilson

Albright & Wilson 5s. shares at 18s. 1½d. have been another good feature of higher dividend hopes, but Monsanto 5s. shares were a little easier at 21s. 10½d., Laporte Chemical 5s. shares 10s. 6d., and Reichhold Chemical 5s. shares lost a few pence on balance for the month at 7s. 1½d. Elsewhere, however, Fisons have been firm and moved up to 34s. 6d. Eaglescliffe 5s. shares were 17s. 3d. xd., Cooper MacDougall & Robertson 34s. 6d., Pest Control 5s. shares 5s. 6d., and Burt Boulton & Haywood 27s., while William Blythe 3s. shares were firm at 9s. 3d. Borax Consolidated deferred have firmed up to 35s. 7½d., British Glues & Chemicals 4s. shares were 9s. 9d., and the participating preference shares 28s. 9d. Removal of a big line of shares that had been overhanging the market put Unilever higher at 48s. 3d., and Unilever N.V. were 45s. 3d. The 4s. units of the Distillers Company have been steady at 17s. 6d., but elsewhere, United Molasses eased to 31s. 6d., after an earlier rise. Coalite & Chemical 2s. shares have changed hands around par. Among plastics, British Xylonite were 26s. 6d., British Industrial Plastics 2s. shares 4s. 3d., and De La Rue 5s. shares 9s. 3d. Elsewhere, Boots Drug 5s. shares were 20s. 3d., Sangers 5s. shares 15s., and among other shares, Staveley were 75s., Powell Duffryn have been active around 32s. 1½d. Turner & Newall were 54s. 6d., 'ex' rights to the new shares. Oils recorded small irregular movements, but Shell at 82s. 6d., moved higher on balance and Anglo-Iranian were £5 11/16.

Export Licensing Controls

Changes in export licensing control have been made by a Board of Trade Order which came into operation on 25 March. Licences are now required for all destinations for lithium alloys and phenylcarbylamine chloride and certain chemicals may now be exported without licence to the Commonwealth (excluding Hong Kong), the U.S.A. or Irish Republic. These chemicals include: acetic acid, barium sulphate, borax, boric acid, butyl alcohol, calcium borogluconate, calcium gluconate, caproic acid, chloramphenicol, citric acid, desoxycorticosterone acetate, isopropyl alcohol, phthalic acid and its salts and esters, succinic acid and its salts, acetone metal bisulphites, acetone and aldehyde metal bisulphites, sulphurous acid, thiosulphates, tanning extracts, tritolyl phosphate and trixylenyl phosphate.

To Limit Functions

It is reported that the directors of Manchester Oil Refinery intend to limit the company's function to that of a holding company and to transfer its business and trading assets to a subsidiary. The conversion will come into effect before the end of the fiscal year.

Company News

Hickson & Welch (Holdings) Ltd.

Despite the trade recession in the textile and paint industries with its consequent effect on sales of dyestuff and colour intermediates and the added restriction on imports imposed by certain foreign countries, the 12 months ended 30 September, 1952, are considered satisfactory in the statement of the chairman, Mr. Bernard Hickson, which accompanied the annual reports and accounts of Hickson and Welch (Holdings) Ltd., which were presented at the annual general meeting in London on 27 March. During the year almost £100,000 had been expended on additional plant and buildings. The need for preservation of timber was being increasingly realised and in the period under review sales of timber preservatives were the highest ever achieved, while the volume of timber treated in Great Britain, New Zealand and South Africa at the plants of the company's subsidiaries was also a record. Profit before tax and depreciation was £175,427 (£173,057). A final dividend of 4½ per cent was recommended on the ordinary stock, making with the interim pay of 3 per cent in May, a total of 7½ per cent for the year.

I.C.I. for Australia

It was announced in Melbourne last week that a net profit of £A995,253 was earned by Imperial Chemical Industries of Australia and New Zealand during the year ended 30 September last. This is the second highest profit yet made by the firm, being exceeded only by the 1951 figure of £A1,262,015. The turnover for the year was £A25,846,000. Overall production was a record but the increase was more than offset by rising costs. Trading profit was £A1,469,000 compared with £A1,766,000 for 1951. The directors propose increasing the authorised capital to £A25,000,000 by creating 10,000,000 unclassified shares.

International Nickel Company of Canada Limited.

Research continued to play an important part in the activities of the International Nickel Company of Canada, Ltd., according to its report for the year ended 31 December, 1952. Oxygen flash smelting of copper concentrates, a major result of Inco research, was carried out on a commercial basis during the year. Also in 1952, large-scale production of liquid sulphur dioxide, obtained as a by-product from the company's oxygen flash smelting of copper concentrates, was initiated by Canadian Industries, Limited, in a new plant built at Copper Cliff, Ontario. The resulting output of this chemical is expected to supply a substantial portion of the sulphur requirements of the sulphite pulp industry in Ontario and Western Quebec. Research activities continued on the development of an economic process for treating nickel-bearing pyrrhotite for the recovery of nickel and iron oxide. The high-quality iron ore obtained in pilot plant operations has been employed in successful full-scale experiments carried out in co-operation with the steel industry. Net earnings of the company and subsidiaries were $58,891,282 (in U.S. currency), the second highest in its history. These earnings were equivalent to $3.90 per share of common stock ($4.17 in 1951). The decrease was brought about by the reduction in value of the U.S. dollar (in which the company's sales are principally made), relative to the Canadian dollar, in which costs are incurred, as well as by increased production costs, mainly in the second half of the year. Nickel deliveries at 249,017,358 lb. showed an increase of over 5,000,000 lb. compared with 1951.

Mathieson Chemical Corporation

In its 61st annual report, 1952 is regarded by the Mathieson Chemical Corporation as a year of major expansion, primarily as the result of the merger with E. R. Squibb & Sons, but many major projects begun in previous years also came to full fruition during the period under review. For the fifth consecutive year new records were established in production, sales, and net income. Research and development have been intensive both in the improvement of processes and plant and in attention to new products, some of which have been already marketed while others will be distributed in the near future. Net sales at $147,109,580 were $55,875,505 higher than in 1951. Net earnings per common share in 1952 were $3.44. This was based on the weighted average of the shares outstanding during the year, 3,142,754 prior to the Squibb merger

and 5,439,781 after 1 October, 1952. The net earnings per common share in 1951 were $3.02 and were based on 3,142,754 shares outstanding, or reserved, after conversion of 7 per cent preferred stock and merger with Hydrocarbon in November of that year.

Redfern's Rubber Works Ltd.

A review of financial progress over the past five years using 31 December, 1946, as a basis for postwar comparisons is contained in the review of the chairman, Thomas H. Redfern, with the report and accounts of Redfern's Rubber Works, Ltd., for the year ended 31 December, 1952. New premises with an area of 80,000 sq. ft., mainly ground floor, are in the process of being purchased, mainly to extend the company's services to the chemical and allied industries. As anticipated in the 1951 review, profit for 1952 is not so good as that year, but current figures have been adversely affected by an exceptional writing down of stock values of about £20,000. Net profit for the year was £35,416. A final dividend of 5 per cent on ordinary shares plus a bonus of 7½ per cent less tax is recommended, making a total for 1952 of 17½ per cent compared with 20 per cent in 1951.

New Registrations

Float-Ore Ltd.

Private company. (517,161). Capital £500. Dealers in ores, metals, minerals, chemicals, etc. Directors: H. Randle, H. H. O. Hill. Reg. office: 34 Stronsa Road, W.12.

Walker Extract & Chemical Co. Ltd.

Private company. (517,381.) Capital £15,000. Manufacturers of tanning extracts and materials, chemicals, etc. First directors not named. Solicitors: John Taylor & Co., Ltd., Manchester, 2.

Australasian Petroleum Refinery

It was announced in Perth last week that the Australasian Petroleum Refinery has been registered in Western Australia to erect, own and operate the refinery at Kwinana, being built by the parent concern, the Anglo-Iranian Oil Company. Anglo-Iranian intends to assign certain rights in connection with the Kwinana project.

CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

SALTERS' INSTITUTE OF INDUSTRIAL CHEMISTRY GRANTS-IN-AID

THE Committee will, in July, allocate a limited number of Grants-in-Aid to young men and women employed in Chemical Works in or near London, who desire to extend their education for a career in Chemical Industry. Applicants must not be under 17 years of age and must have Matriculation or its equivalent.

Applications should be made as soon as possible whereupon forms will be issued requiring particulars of age, nature of employment and the manner in which the Grant would be used.

The application forms should be received, completed, before 15th May, 1953, by :—

THE CLERK OF THE SALTERS' COMPANY,
Salters' Institute of Industrial Chemistry,
36, Portland Place.
London, W.1.

SITUATIONS VACANT

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

SENIOR SCIENTIFIC OFFICERS; SCIENTIFIC OFFICERS; PATENT EXAMINER AND PATENT OFFICER CLASSES. The Civil Service Commissioners invite applications for permanent and pensionable appointments to be filled by competitive interview during 1953. Interviews will continue throughout the year, but a closing date for the receipt of applications earlier than December, 1953, may eventually be announced. The Scientific posts are in various Government Departments and cover a wide range of Scientific research and development in most of the major fields of Fundamental and Applied Science; in Biology the number of vacancies is small. The Patent posts are in the Patent Office (Board of Trade), Admiralty and Ministry of Supply.

Candidates must have obtained a University degree with first or second-class honours in an appropriate scientific subject (including Engineering) or in Mathematics, or an equivalent qualification; or for Scientific posts, possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience. Candidates for Scientific Officer and Patent posts taking their degrees in 1953 may be admitted to compete before the result of their degree examination is known.

Age Limits: Senior Scientific Officers, between 26 and 31; for Scientific Officers and Patent Classes, between 21 and 28 during 1953 (up to 31 for permanent members of the Experimental Officer class competing as Scientific Officers). London Salary Scales: Senior Scientific Officers (men), £812-£1,022; (women), £681-£917. Scientific Officers (men), £440-£707; (women), £440-£576. Patent Examiner and Patent Officer Classes (men), £440-£655; (women), £440-£576. Somewhat lower rates in the provinces.

Further particulars from the **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, TRINIDAD HOUSE, OLD BURLINGTON STREET, LONDON, W.1,** quoting **No.** S.53/53 for Senior Scientific Officers and S.52/53 S.128/53 for the other posts.
20094/150/LMS

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ASSISTANT CORROSION ENGINEER required by **KUWAIT OIL COMPANY** for service in Kuwait. Should possess a Degree in Electrical or Chemical Engineering or Metallurgy, but Higher National Certificate in any of these subjects plus a full recognised engineering apprenticeship would be acceptable. Experience in Corrosion Engineering an advantage but not essential, as successful candidate will undergo some training in the U.K. Age 22-30. Overseas salary, starting £790 per annum clear, plus generous allowances, Pension Scheme and kit allowance. Write for application form, giving personal details and quoting K.1676 to **BOX W/18, c/o 191, GRESHAM HOUSE, E.C.2.**

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1½ TONS MANGANESE BRONZE TUBES, 1½ in. o.d., 1 ⅜ in. i.d., and 1 ⅛ in. o.d., 1 in. i.d. Lengths 12 ft. to 14 ft.

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1—Baker Perkins **MIXER** as above, not steam jacketed, single geared, complete with 25 h.p. A.C. motor.

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27—Various **POWDER DRESSING** or **SIFTING MACHINES,** totally enclosed with barrels from 80 in. long by 22 in. diam. to 120 in. long by 30 in. diam., belt driven with collecting worm in hopper bottoms.

1—Simon Horizontal Tubular **DRIER,** 12 ft. long, 100 lb. steam pressure, size 3B, requiring 12 b.h.p.

4—Recessed Plate **FILTER PRESSES,** 30 in. square, 70 plates in each, centre fed.

5—Johnson **FILTER PRESSES,** 24 in. square, side feed and enclosed delivery, fitted 29 plates and 30 frames.

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

Johnson Oil **FILTER PRESS,** Premier type plates 2 ft. 8 in. by 2 ft. 8 in., of which there are 45, with angle lever closing gear.

1—Johnson **FILTER PRESS,** 42 C.I. plates, 32 in. square, centre feed.

Steam-heated **FILTER PRESS,** Premier type, 32 in. square, with 30 recessed plates.

Wood **FILTER PRESS,** fitted 69 ribbed plates, 2 ft. 8 in. square, with top centre feed and bottom enclosed delivery channel.

1—24 in. **HYDRO EXTRACTOR,** self balancing, swan-neck type, self emptying bottom.

Heavy Cake **CRUSHING MILL,** 2-pair high, by Nicholson, for cake up to 3 in. thick, rolls 30 in. long, top with coarse teeth 9 in. diam., bottom with finer teeth 12 in. diam.

5 Sets A.A. **CRUSHING ROLLS** for linseed, cotton seed, etc., 48 in. long, belt driven, with feed hopper, side frames, baseplate and striking gear.

Bennett Copper-built **EVAPORATOR,** 4 ft. diam. by 4 ft. 6 in. high, steam-jacketed bottom, mounted on legs, with swan-neck vapour pipe and separate vertical belt-driven vacuum pump.

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1—" U "-shaped **MIXER,** as above, but 7 ft. long.

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1—No. 1A Water-cooled **CIRCULATOR MILL.**

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TWO 72 in. **HYDRO EXTRACTORS** by Thomas Broadbent. 72 in. galvanised basket, 20 in. deep, ¼ in. perforations. Motorised 400/3/50.

Five Electric **MAGNETIC SEPARATORS** by H. G. Richardson, Reco type D.83, 180v., 1 amp.

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SCREENLESS PULVERIZERS for fine grinding of Chemicals. Also CYCLONES, ROTARY VALVE FEEDERS. Callow (Engrs.) Ltd. Kirkby Trading Est., Liverpool.

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TWO Gunmetal Duplex Fin-blade Jacketed Tilting Enclosed **" MELVIN " MIXERS,** 29 in. by 27 in. by 24 in. deep, 30 ft. by 9 ft. diam. R.S. **TANK,** 12,000 gallons capacity.

New Stainless Steel 50-gal. **PANS.** Ditto, 100-gal., with electric agitator.

Stainless Steel Jacketed Cylindrical Gas-heated, Enclosed **MIXER,** 22 in. by 36 in. deep.

Stainless Steel **" GARDNER " POWDER MIXER,** 400/3/50.

Twin " Z "-blade **MIXERS,** 5 in. by 4 in. by 3 in.; 6 in. by 11 in. by 11 in.; 16 in. by 16 in. by 14 in.; 20 in. by 20 in. by 18 in.; 29 in. by 27 in. by 27 in.; and 36 in. by 30 in. by 26 in. deep.

Four **" U "-TROUGH SIFTER/MIXERS** and various Jacketed **PANS** and **MIXERS** up to 1,200 gal. **PUMPS, HYDROS, STILLS, CONDENSERS OVENS, AUTOCLAVES, DRYERS, ETC.**

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INDUSTRIAL REFRIGERATION MACHINES
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WORKING NOTICES

THE Proprietors of Patent No. 598602 for **"METHOD OF PRODUCING COPOLYMER RESINS AND PRODUCTS DERIVED THEREFROM"** desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to **HASELTINE LAKE & CO., 28, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.2.**

THE Proprietors of Patent No. 616260 for **"IMPROVEMENTS IN AMD RELATING TO CATALYSTS FOR POLYMERISATION AND CONDENSATION OF HYDROCARBONS"** desire to secure commercial exploitation by licence or otherwise in the United Kingdom. Replies to **HASELTINE LAKE & CO., 28, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.2.**

THE Proprietors of Patent No. 617944 for **"IMPROVEMENTS IN FROTH FLOTATION PROCESSES"** desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to **HASELTINE LAKE & CO., 28, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.2.**

THE Proprietor of British Patent No. 629899 entitled **IMPROVEMENTS IN TREATMENT OF IMPURITY-CONTAINING SOLUTIONS,** offers same for license or otherwise to ensure its practical working in Great Britain. Inquiries to **SINGER, STERN & CARLBERG, CHRYSLER BUILDING, NEW YORK, 17, N.Y., U.S.A.**

THE Proprietors of Patent No. 631325 for **"MANUFACTURE OF HYDROCARBONS"** desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to **HASELTINE LAKE & CO., 28, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.2.**

THE Proprietors of Patent No. 632291 for **"IMPROVEMENTS IN METHODS OF DEHYDROGENATING ALIPHATIC HYDROCARBONS"** desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to **HASELTINE LAKE & CO., 28, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.2.**

THE Proprietors of Patent No. 632350 for **"IMPROVEMENTS IN OR RELATING TO DEHYDROGENATION CATALYSTS AND METHOD OF PREPARING SAME"** desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to **HASELTINE LAKE & CO., 28, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.2.**

IT is desired to secure the full commercial development in the United Kingdom of British Patent No. 634216 which relates to **"PROCESSES OF PREPARING POLYVINYL ACETATE EMULSIONS,"** either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specifications should apply to **STEVENS, LANGNER, PARRY & ROLLINSON, 5 to 9, QUALITY COURT CHANCERY LANE, LONDON, W.C.2.**

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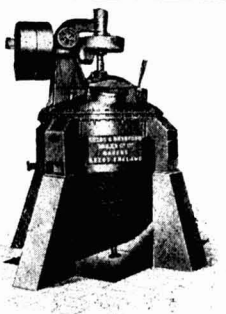

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