The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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No. 1403

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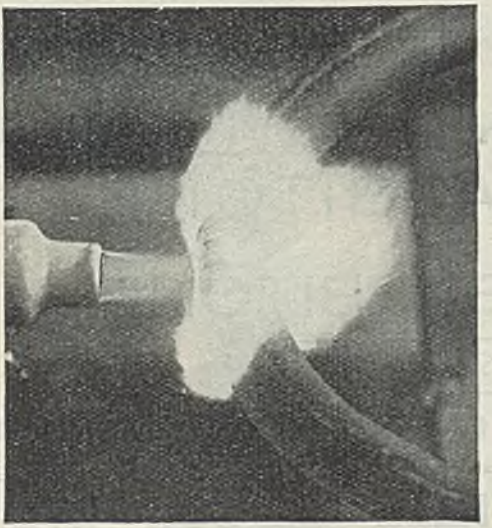

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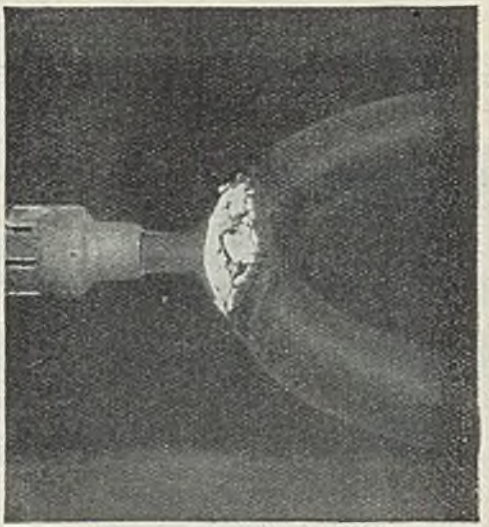

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VOL. LIV No. 1403. May 18, 1946 Annual Subscription 21s. Overseas 26s.

A Type of Research We Haven't Got

THERE are in America, and open to American industry, research institutions of a type that we do not possess in this country. We refer to the public institutions, such as the Mellon Institute, to which industrialists can bring their problems for solution, in apparatus of at least pilot-plant size, on moderate financial terms. It has often been said that in this country we lack the means to carry out organised research on a practical scale, and famous men have called attention to this need on many occasions. A recent technical paper, for example, insisted that "in addition to general research facilities it is essential to set up an organisation generally similar to the Mellon Institute of America which shall give to inventors the opportunity of trying their ideas on a larger scale than is possible in the laboratory. The inventor in this country is dependent on an existing firm or private financier for facilities for taking his process from the very small scale to the larger scale; this hinders development on good processes, and in the hands of unscrupulous financiers may result in nothing more than the exploitation of the public. In any event, it puts the inventor at a disadvantage since he is at the mercy of the firm or financier who gives him the support. There is no country in the world that discourages the inventor as much as this country has done in the past. It is not suggested that the position of research workers regularly employed by firms is prejudiced in this way, but the indepent research worker who is not prepared to work for a salary is gravely handicapped. In illustration it may be recalled that Baekeland, the inventor of Velox printing papers and of Bakelite, left England and took his ideas to America because of the lack of facilities in this country for trying his laboratory processes on the commercial scale."

There has lately come into our possession an illustrated prospectus (if that be the right word) of another similar body, The Battelle Memorial Institute, Columbus, Ohio. We do not know anything at first hand of this Institute, but we have culled certain information from this document and we set that information before our readers since, whatever may be the success with which the Battelle Institute lives up to its expressed objectives, it would appear to be the sort of thing that we should endeavour to establish in this country. If necessary. Government aid could be called in, though we should much prefer industry to establish

On Other Pages

such a body by private enterprise. Admittedly, the National Physical Laboratory will do work on selected projects in certain fields on very similar lines. Admittedly, also, the research associations do something similar for their individual industries, and for their own members, but in general only if the problems seem to be of sufficiently wide interest. We certainly need institutes to which anyone can turn for assistance whether belonging to a research association or not, and which are equipped with large-scale plant.

The Battelle Institute, we read, was established 15 years ago through a bequest from one Gordon Battelle, which provided a sum of money for the building and endowment of the Institute " for the purpose of education and creative and research work and for making of discoveries and inventions for industry." The founder had extensive interests in coal, iron, and steel. In normal times the Institute supports a programme of fundamental research from its endowment funds in the various fields which it serves. The findings from such research are made available for the advancement of scientific knowledge. These findings also benefit industrial sponsors owing to the experience and knowledge thereby gained by the staff. The staff now numbers 600 and is ready at any time to conduct research for industry. The Institute provides the plant, the equipment, the personnel. The company or group under whose auspices the research is done, known as the " sponsor," pays for the time of the personnel assigned to the enterprise, and the out-of-pocket costs. It is estimated that the amount of money so spent in 1944 was $2,500,000. The research project is defined and planned in consultation between the Institute and the sponsor. It is then assigned to one of the operating divisions, and the supervisor of that division is responsible for its execution. Not only is the work reviewed from a technical aspect, but the economic angle also is given full consideration.

Among the divisions listed are minerals, fuels, metallurgy (ferrous and non-ferrous), welding, ceramics, electrochemistry, chemistry, physics, production research, and engineering economic problems. The Institute acts, for example, as " the principal research laboratory of Bituminous Coal Research, Inc., the research agency of the bituminous coal industry." The electrochemical division " specialises in the study of corrosion and surface finish problems. . . An outstanding achievement of the electrochemical research laboratories is a process for the electrochemical polishing of metals." The chemical department deals with both chemistry and chemical engineering: " virtually all fields of chemistry are served, including inorganic chemicals, plastics, petroleum, coal-tar distillation, organic synthesis, paints and varnishes, paper chemistry, food, textiles, fungicides, preservatives, high pressure syntheses, waste disposal, chemical treatments of wood, adhesives, synthetic rubber," and so on. It is evident from the illustrations that the equipment comprises both laboratory and plant at least of semi-scale size, and perhaps in many instances of full-scale size. In physics, the Institute possesses an electron microscope, in itself a rare tool in this country. Among the groups working in this field are those conducting research upon problems of wear and abrasion, physical and mechanical testing, X-rays, the electron microscope, the electron diffraction camera, electronics, metal fatigue, and many kindred subjects.

A central organisation on a more modest scale is also in existence in France. We are referring to the Maison de la Chimie in Paris, some notes on which are included on a later page of this issue. It will there be seen that French industrialists, through their Society of Chemical Industry, played a large part in organising this institution as a sort of information and documentation centre for the chemical industry.

We ask in all seriousness whether there is not something here that is well worthy of being copied in this country. If so, what are we going to do about it and who is going to do it? We are at the beginning of the scientific age. Without science we are lost. Unless we make the fullest use of science we are lost. It is the function of the technical press to call attention to these things; but it is upon the industrialists that the onus must rest of taking whatever steps are necessary to remove the handicap that this country has in lack in the facilities for large-scale research that are open to the industries of other nations. Scientific research and politics are incompatible; but with the governors of the country in their present ideological mood, justification can doubtless be found for the nationalisation of almost anything. Quick action to establish a system of scientific research outside governmental control would therefore seem to be indicated.

NOTES AND COMMENTS

Private Enterprise Hits Back

STUNG by the impact of insults and innuendos from Government spokesmen, the exponents of private enterprise have at last made their retort. In the issue for May 9 of the official *Journal of the National Union of Manufacturers*, they claim that, by reason of its actions and plans which have created widespread uncertainty, it is the Government and not private enterprise which is on trial to-day. The Government has certainly been shaking the Big Stick. The Chancellor began it by threatening a new tax on profits in the future unless private enterprise behaved itself in the meantime. Later, the Attorney-General uttered the inept boast that " we " are now the masters, implying that industry would have to toe the line. One wonders, along with the National Union of Manufacturers, exactly what that " we " represents. Meanwhile, manufacturers are asking for a specification of the misdemeanours which they are supposed to avoid. They are asking, moreover, from whom, if not from private enterprise, will come the new ideas both for quality and for volume of production with which the essential export drive is to be implemented. They are asking who, if not private enterprise, is to equip the famous " Britain Can Make It " exhibition which is to be held this autumn. Finally, and most cogently, they are asking about the quality, rate of supply, and cost of " nationalised " coal, the prices of State-supplied gas and electricity, the cost and availability of Government transport, of State steel, and of all that is to come after in the way of nationalised services. They contend, with some justice, that with all these problems unresolved it will be the Government and not the manufacturer who must accept the blame if industry is crippled.

Memorandum on Patents

THE Chartered Institute of Patent Agents has published, more or less simultaneously with the Second Interim Report of the Swan Committee, an elaborate document, *Memorandum of Evidence, Part II*, which had been submitted some time before to the Swan Committee and has been partly incorporated into the said report. Many of the recommendations included in the memorandum, however, have not been taken over by the report. It seems a pity that such an exhaustive document, containing the concentrated effort of many expert minds in the patent profession, should have been published so late that the public concerned could not avail themselves of it in time to support or supplement some of the recommendations by direct evidence to the Swan Committee. As a final report is still awaited from the Swan Committee, it may be that some of the recommendations will yet be considered.

Selected Recommendations

SOME of the suggestions, picked out more or less at random from a document covering 19 printed foolscap pages, are as follows: (1) Bringing the Form of Grant of Letters Patent up to date by omitting some of the venerable historical passages which have become obsolete, and stating the patentee's rights more clearly instead. (2) Patents for testing materials—at present not falling within the term of " manner of new manufacture " of the Statute of Monopolies, 1624—should be admitted if and when they lead to an improved manufacturing process. (3) The true and first inventor need not be one of the applicants (as under the present Act), provided he consents to the application being made in somebody else's name. The name of the actual deviser should always be mentioned in the specification. (4) The requirements for the Complete and Provisional Specifications should be modernised, and exaggerated demands for precision of wording—comparable with a deed—sometimes made by judges thinking in purely legal terms, should be brought in line with technical possibilities, which limit such accuracy, particularly if new ground is broken. (5) The term " effective priority date " is suggested to replace the present complicated wording, in order to define, in one single term, such occasions as the filing date of a Provisional Specification, or of a Complete Specification not preceded by a Provisional, and similar dates. (6) Reform of the Search for Novelty under Sections 7 and 8 of the Act, particularly as far as " prior claim " (as distinguished from prior disclosure) is concerned. (7) The dates of acceptance and of publication

of the printed specification should coincide. (8) The rights of joint patentees to be better defined; the disguise of licences by one partner transferring his rights by bits and pieces to many assignees should be prevented by allowing each partner to assign his share in the patent to one person (physical or corporate) only.

I.C.I. Catering

IN this issue reference is made to the expansion programme on which I.C.I. propose embarking at a total cost of more than £40,000,000; and from the employees' standpoint at least it is significant that the programme makes provision (among other things) for welfare amenities. Of no little importance among such amenities is the provision of adequate facilities for workers' meals and in this connection the company has already established for itself an enviable reputation. Indeed, I.C.I.'s catering organisation is on a scale commensurate with the size of the firm itself. No fewer than 150 canteens were being operated by the I.C.I. organisation for its employees at one time during the war, to say nothing of a large number of staff and workers' hostels, including a fully-licensed hotel. At the "peak" period about 110,000 people a day were being provided with main meals, snacks, and beverages in the company's own catering establishments. When due regard is had to the number of different industries included in the I.C.I. organisation, with consequent differences in working conditions, it will be appreciated that the complicated business of feeding so many employees "on the job" was no light task.

An Essential Welfare Service

I.C.I. obviously regards catering as an essential part of its welfare service and there is no doubt it has come to stay. The part it will play in the greatly expanded post-war activities of the company will be fully as important as in the tremendous contribution made by the company and its associates to the winning of the victory. For many years now, the company has successfully operated workers' canteens, with the primary object of providing employees with good meals at reasonable prices, and while the canteens are expected to cover certain direct expenses, it is realised that financially they cannot be self-supporting. As a result of close study of the whole problem, many improvements have been made in most of the canteens and further improvements are contemplated. There is a special system of training for the cooks employed and the organisation is fully alive to the need for further expert training for all grades of canteen staff. A standard costing system, incorporating a special store-keeping system, is in general use throughout I.C.I. canteens, and the usage of the various items of food is carefully analysed. Each area of the U.K. is looked after by regional catering advisers, and they are directly responsible to I.C.I.'s chief catering adviser, Mr. W. J. Willmoth, who supervises the whole of the company's extensive catering service.

Entry into Universities

THANKS to an explanatory note issued on Monday, the somewhat hazy statement made by the Minister of Labour last week on the conditions of new entry into universities has now been clarified, and young men of age groups up to September 30, 1928, can now have some idea of their immediate fate. First priority of entry is justly given to those released from the Forces in Class A, and to the corresponding group of men employed on work of national importance in industry. Scholars and "young men of high promise" up to Group 55, nominated by the universities for release in Class B, are in the same category, as are similar young men, identified by the universities, who by September 1 this year will have completed three years' work of national importance (military or otherwise) since they reached the age of 18. Second priority will be given to scholars and other promising students from schools in the age group October 1, 1927, to September 30, 1928, and to certain men in medical grades 3 and 4. It is suggested that women should be given preference on the same basis as men, but it is hoped that women who are not in the first priority class, and whose acceptance would mean the exclusion of men who are, will be admitted only if they are of exceptional promise. The only really unhappy position now is that some of the candidates from schools, as in some cases it will not be possible to reach a final decision about them until as late as September 1, in order that Service candidates may be given the maximum chance of entry.

The Fuel Position and Exports

Lord McGowan's Warning : I.C.I. Expansion Plans

A WARNING that unless coal supplies improve, further cuts may be expected in the export of essential chemicals from this country, is given by Lord McGowan, chairman of I.C.I., Ltd., in the course of the printed statement accompanying the annual report which is to be presented at the 19th annual general meeting of the company at Wigmore Hall, Wigmore Street, London, W.1, on May 23. Lord McGowan also alludes to the likelihood of further increases in the prices charged for the company's products, following on the higher price of fuel and increased wage rates.

Of particular importance is the announcement by Lord McGowan of an eight-year development programme by I.C.I., involving a total capital expenditure of no less than £40,000,000.

"The successful conduct of the chemical industry, which not only manufactures a large volume of intermediate products essential to other industries but also exports a large and growing proportion of its total production," states Lord McGowan, "depends entirely upon the satisfactory solution of the coal problem; and emphasis cannot be laid too strongly on the urgency of this problem and the need to reverse the present trend of decline in the output and quality of coal and of increase in its price. The continuous deterioration throughout the year brought matters to a critical stage. Grave statements have already been made by the Minister of Fuel and Power. Cuts in the output of certain of our products, which resulted in a fall of exports at the rate of approximately £2,500,000 per annum, were imposed in January, 1946. Further reductions in output over a range of basic industrial chemicals may follow if coal supplies do not improve."

Future Prices

Referring to the future outlook, Lord McGowan states: "The board throughout the war made it a firm policy to keep all prices at the lowest possible level and have endeavoured to support that policy by a continuous drive to reduce costs through increased efficiency and higher yields. Much of the company's expenditure on research is directed to these ends. The costs of manufacture of many of our products have increased substantially owing to the much higher price of fuel and increased wage rates. Since 1939 our cost per ton of coal has risen by 108 per cent. and our bill for coal and coke, for a slightly smaller quantity, was approximately £3,500,000 higher in 1945 than in 1938. Again, since 1939, rates of wages including war supplement have increased slightly over 50 per cent. This increase includes advances negotiated a few weeks ago, which alone will add approximately £1,000,000 to our annual wage bill. Increases in the prices of a number of products have therefore been unavoidable and more may have to follow.

The Export Problem

"The board recognise the urgent national need for increased exports, in order to pay for the imports necessary to maintain our standard of living," Lord McGowan continues. "This calls for a greater volume of production through enhanced efficiency in the use of man-power and the utmost use of plant and machinery. This problem will not only test those responsible at all levels for management, but will also require the statesmanship and understanding of the leaders of our great trade unions, through their influence on the outlook and work of their members. The volume of work to be done is so huge and will extend so far into the future as to call for the unrestricted labours of all of us. I therefore warmly welcome the assurances of co-operation in increasing productivity recently given by the General Council of the Trade Union Congress. But the whole field of production is overshadowed by a shortage of coal. For their part, the board are confident that they can rely on everyone who works in the company's service to apply to the vital tasks of peace the same effort, enterprise, enthusiasm and efficiency with which they solved the problems of war production.

"During the difficult times that lie ahead of us, in which we have to make good the ravages of war, build up our exports to fill the gap left by shipping losses and sales of overseas investments, and restore and raise our pre-war standard of living, British industry will need every bit of assistance and co-operation that the Government can give: shortage of man-power and raw materials will necessitate governmental guidance and control, but the widespread programme of nationalisation on which the Government has embarked necessarily introduces an element of uncertainty into almost every decision which industrialists have to take. I hope that every effort will be made by the Government to confine restrictions and controls within the narrowest possible limits and to remove uncertainties in order that industrialists may pursue undisturbed their vital task of concentration on the job of production."

The announcement of the company's ex-

pansion plans is made by Lord McGowan as follows:

"During the last three years, much time and thought have been devoted to examining the ways in which the company can best assist the country's efforts to re-establish and expand its productive capacity. A provisional long-term programme of capital expenditure covering the next eight years has been prepared, amounting in all to over £40,000,000. Each proposal is being examined separately, and we have allotted priorities so that the products most urgently required may become available as quickly as circumstances permit. The actual rate of progress on this work must depend on the degree to which materials, labour, and scientific staffs become available.

New Plant and Extensions

"The programme makes provision for improvements and extensions of our existing manufacturing plants and services, for construction of entirely new plants, for extensions to research laboratories, and for welfare amenities.

"The first instalment of the programme will include important extensions of the alkali plants directed toward both home and export trade in these products, modernisation of power plants, particularly in the Merseyside area, and extensive construction of additional dyestuffs plants to provide the necessary post-war production capacity.

"As already announced in the Press (*see* THE CHEMICAL AGE, 1946, *54*, 523) the company has an extensive plan for industrial expansion in the development area near Middlesbrough, where the Wilton estate has been acquired. It is our intention to use this site as the location of future large-scale chemical operations for which centres now established are neither convenient nor economic. Its major development will necessarily take place over a long period of years. As at present envisaged, the initial developments will mainly be in connection with the heavy organic chemical industry; the year 1946 will be largely occupied in planning and site development work.

"Negotiations are proceeding with the Government with a view to taking over certain of the agency factories built and operated by the company for the Government during the war, which can be adapted for peace-time production. In pursuance of this policy the Gowerton factory at Waunarllwydd, near Swansea, has been purchased outright for the manufacture of light alloys, the production of which has been transferred from Birmingham to the development area in South Wales; this factory is finding regular employment for 1200 persons, of whom about 800 are men. Individual plants in other factories have been leased for limited periods.

"In framing our plans for extension, both on the Wilton estate in North-East Yorkshire and at the Gowerton factory in South Wales, we have been influenced by the need for promoting the wider spread of employment. Other immediate capital projects relate to nylon polymer for conversion into yarn for hosiery and general textiles, to insecticides and pesticides, and to refrigerants."

In the earlier part of his statement, Lord McGowan says the end of the war and the subsequent cancellation of Government contracts brought an inevitable drop in the volume of the company's sales, but already by the end of 1945 considerable progress had been made in turning over to production of peace-time needs. The problem of reconversion is less acute for the company than for some industries, since the majority of the company's products are the raw materials of other industries and so vary less from peace to war. Divisions whose production was devoted almost entirely to the needs of the Armed Forces were able within a few months to find normal markets for their products. The general progress of reconversion throughout the country affects the company directly in two ways. The demand for products such as heavy chemicals depends on the progress made by other industries, and the rate at which supplies of raw materials and labour are forthcoming determines the company's ability to reach the maximum output.

In some cases already it has been difficult to meet orders, and there is no doubt that the demand for the whole range of the company's products will be heavy and sustained, provided that no major setbacks outside the company's control are encountered. The problem is to achieve an expansion of production adequate to meet expected requirements. On the whole, the labour problems involved in reconversion are being tackled successfully, although man-power shortages in certain of the company's undertakings continue to cause anxiety.

Research Budget

The company's budget of expenditure on research and development continues to be heavy; it is planned to spend this year some £3,250,000. The expansion of exports is well to the forefront of the board's attention. Up to the end of 1945, 3454 pre-war employees, including 600 members of the staff, had returned from the Forces to the service of the company. There were 8895 still serving. The total number of employees killed in action during the war was 799, and 59 civilian employees lost their lives through enemy action. During the year, 84 employees were decorated for bravery or were mentioned in despatches, bringing the total of these honours up to 184.

The total gross income shown in the consolidated income statement is £15,213,420,

compared with £18,227,401 for 1944, a decrease of £3,013,981. This is principally due to rises in costs, chiefly coal and wages, accompanied by a fall in volume of business, mainly through closure of war contracts. The consolidated income for the year has risen from £7,223,271 to £7,692,729, an increase of £469,458, after providing £3,314,133 for obsolescence and depreciation, which includes the year's provision of £2,500,000 for the Central Obsolescence and Depreciation Reserve. The increase in income is entirely due to a larger amount brought to credit from past over-provisions for taxation as shown in the consolidated income statement.

The amount so brought to credit in 1945 is almost solely on account of the further progress made in estimating the effect of war-time working upon the company's plants and in settling claims for appropriate taxation wear-and-tear allowances for past years. These calculations are complex and extensive, and have not been finally completed. It is, however, clear that not less than £1,000,000 should be specially appropriated to the Central Obsolescence and Depreciation Reserve on this account. Furthermore, the board cannot ignore the increase in post-war costs of capital construction. For these reasons the board have made a special appropriation to the reserve totalling £1,500,000 in the accounts for 1945. Full taxation on all profits made to December 31, 1945, has been provided or reserved. A sum of £3,214,000 therefore appears under the heading of Provisions for Future Liabilities in the statutory balance sheet of the company.

Figures Compared

The 1945 total receipts by the company and its subsidiaries and the manner of their disposal are as follows, the figures being given in million pounds, with 1944 figures in brackets:

The aggregate gross manufacturing and trading proceeds were £105.3 (151.1). The amount of £61.6 (67.2) was spent on raw materials and purchases for re-sale, maintenance of plants, freight charges, and factory and sales administration expenses (exclusive of personnel), while £3.3 (3.5) was set aside for obsolescence and depreciation of plants. That left £40.4 (44.4) as the net proceeds of manufacturing and trading activities, to which there must be added the company's investment property, and miscellaneous income, less charges £1.0 (1.3), making a total of £41.4 (45.7). Of this, £41.4 (45.7), wages, salaries, pensions, and contributions to pension funds took £31.8 (33.3), and £4.6 (7.9) was provided for United Kingdom and overseas taxation, leaving £5.0 (4.5) net, after taxation, available for the company's reserves and net dividends to stockholders. Of this sum, £3.2 (3.2) was distributed as net dividends, and the company retained £1.8 (1.3) for addition to its reserves, of which £1.5 (1.0) was appropriated as a special addition to the Central Obsolescence and Depreciation Reserve.

The directors recommend a final ordinary dividend of 5 per cent., making 8 per cent. for the year, which is the same as the previous year.

LETTER TO THE EDITOR

Social Security

SIR,—One of the objects behind the Social Security legislation proposed by the present Government has been to enable manual workers to maintain their accustomed standard of life on retirement from paid employment. In the case of chemists and indeed of most professional workers, this desirable object is normally achieved through the membership of a superannuation scheme run by a private employer. However, in seeking an assured income on retirement the chemist is subjected to severe restrictions which do not apply to the manual worker.

Most of these superannuation schemes are financed by contributions from both employer and employee, and the restrictions arise from the fact that contributions are not transferable from one scheme to another on change of employment. With few and unimportant exceptions, the chemist receives back his own contributions with interest at varying rates added, but loses all right to the contribution made by the employer on his behalf.

The resulting prospective loss in superannuation income acts as a serious deterrent to changes of employment among older chemists, particularly among those with more than ten years' service in one establishment. A certain amount of interchange between the various industrial, academic, and civil service establishments employing chemists is certainly beneficial to quality of work. Moreover, the relative immobility of older chemists has meant that their salaries have not followed the rise in cost of living as closely as those of their younger colleagues.

There is a strong case for legislation to provide for transferability between different private employers' superannuation schemes. If the variation among private schemes makes this impracticable, then they should be incorporated into a national scheme, similar to that for university teachers, giving benefits corresponding to those now given by the schemes of the better private employers.—Yours faithfully,

A. E. ROUT.

Middlesbrough.
May 14.

Sulphuric Acid Production

Quarterly Statistical Summary

FOLLOWING the six-months' summary issued at the beginning of the year *(see* THE CHEMICAL AGE, February 9, p. 164), the National Sulphuric Acid Association has published details relating to the production and consumption of sulphuric acid, etc., in the United Kingdom and Eire for the first three months of 1946, and these are summarised in the following tables:

TABLE I.—SULPHURIC ACID AND OLEUM
(*Tons of* 100 *per cent.* H_2SO_4)

	Chamber only	*Contact only*	*Chamber and Contact*
Stock, January 1, 1946	38,547	28,986	67,533
Production	181,971	146,230	328,201
Receipts	41,191	21,700	62,891
Oleum feed	—	2,258	2,258
Adjustments	—	—	—
Use	115,594	74,845	190,439
Despatches	111,959	99,175	211,134
Stock, March 31, 1946	34,156	25,154	59,310
Total capacity represented	220,930	178,620	399,550
Percentage production	82.4	81.9	82.1

TABLE II.—RAW MATERIALS
(*Tons*)

	*Pyrites**	*Spent Oxide*	*Sulphur and H_2S*	*Zinc Concentrates*
Stock, January 1, 1946	86,253	130,299	30,261	54,585
Receipts	67,890	53,894	37,073	60,918
Adjustments ...	+767	+1,442	−35	+13
Use	79,539	48,465	43,922	40,084
Despatches ...	1,247	3,804	172	—
	39†	465†		
Stock, March 31, 1946	74,085	132,901	23,205	74,055

* "Receipts" and "Use" include anyhdrite "converted" to pyrites.
† Used at works for purposes other than sulphuric acid manufacture.
Note.—The above figures exclude all Government plants—*i.e.*, R.O.Fs., Agency Factories, and other Government-financed plants.

TABLE III.—CONSUMPTION OF SULPHURIC ACID AND OLEUM
UNITED KINGDOM AND EIRE
(*January* 1 *to March* 31, 1946)

Trade Uses		*Tons 100% H_2SO_4*
60	Accumulators	2,166
61	Agricultural purposes	108
62	Benzol (*see* 102)	
63	Bichromate and chromic acid ...	2,229
*64	Borax and boracic acid (*see* 105)	
65	Bromine	1,569
*66	Chlorsulphonic acid (*see* 105)	
67	Clays (Fuller's Earth, etc.) ...	1,686
68	Copper pickling	563
69	Dealers	3,205
70	Drugs and fine chemicals ...	2,775
71	Dyestuffs and intermediates ...	13,520
72	Explosives	3,583
73	Export	431
*74	Formic acid (*see* 105)	
75	Glue, gelatine and size	90
76	Hydrochloric acid	13,290
77	Hydrofluoric acid	629
78	Iron pickling (including tin plate)	18,024
79	Leather	1,194
80	Lithopone (*see* 85)	
81	Metal extraction	219
82	Oil (mineral) refining	5,786
83	Oil (vegetable) refining	1,901
84	Oxalic, tartaric and citric acids ...	1,661
85 & 80	Paint and lithopone	13,714
86	Paper, etc.	741
87		
88	Phosphates (industrial)	749
89	Plastics, not otherwise classified ...	2,631
90	Rare earths	1,653
91	Rayon and transparent paper ...	27,819
92	Sewage	2,406
93	Soap and glycerine	1,026
94	Sugar refining	105
*95	Sulphate of alumina (*see* 105)	
96	Sulphate of ammonia	60,192
97	Sulphate of barium	893
98	Sulphate of copper	6,544
99	Sulphate of magnesium	2,097
100	Sulphate of zinc	484
101	Superphosphates	117,005
102 & 62	Tar and benzol	3,689
103	Textile uses	4,372
105	Unclassified—*Uses known ...	17,456
	Uses unknown ...	6,501
	TOTAL	344,706

INDUSTRIAL EXHIBITION

An exhibition which Johnson, Matthey & Co., Ltd., are holding at Dorland Hall, Lower Regent Street, London, S.W.1, from June 13 to 26 inclusive, has been arranged so that the specialised products and services of the company, and their applications in an ever-widening range of industries, may be seen for the first time as a comprehensive whole. It will reveal many interesting and important advances made in the light of war-time experience. Admission will be by invitation card only. Applications for cards should be addressed to the Exhibition Secretary, Johnson Matthey & Co., Ltd., 73-83 Hatton Garden, London, E.C.1.

WELDING RESEARCH

A research group has been formed by the British Welding Research Association to examine and overcome, if possible, the causes of failure in welded mains which are subject to the action of unpurified coal gas. The group includes representatives of contracting companies, the Gas Research Board, gas undertakings, steelmakers, and certain members of university staffs. A co-ordinated programme of work is now under consideration. When the nature of this programme is decided, arrangements will be made for research work to be carried out in universities and elsewhere and for practical trials to be made under working conditions.

SAFETY FIRST

Safety Considerations in Plant Design—IV

by JOHN CREEVEY

IT is *before* placing an order for some particular plant unit that the danger of hazardous operation can often be avoided. In this connection the questionnaire of the supplier of plant serves a useful purpose, especially when the questions are in greater detail than normally, and they are fully answered. Taking as an instance the case of an inquiry for a single-stage centrifugal pump, directly coupled with an electric motor on a common bedplate, it may be desirable that this pump be arranged for delivery at two or more different levels or "heads." In these circumstances it is essential for this requirement to be made plainly evident to the supplier of the pump, together with a statement whether it will be preferable (from the user's point of view) to instal a variable speed motor, or whether it is intended to throttle the delivery by means of a valve on the pressure side of the pump.

In the absence of one of these alternatives, conditions will quite likely arise where the quantity of liquid delivered at the lower head becomes so great that the motor will be seriously overloaded. Should that happen it is futile to put the blame on the firm which supplied the pump, for that danger could scarcely have been foreseen without all possible information on the intended method of usage. Of course, the most conscientious supplier of plant would have asked for further details of intended usage, if the information already provided appeared to be rather vague or lacking in certain details. Yet it sometimes happens that an over-enthusiastic salesman may overlook this aspect of the duties which he is expected to carry out in maintaining the high reputation of his firm at the same time as obtaining orders. Both buyer and seller always benefit by giving detailed consideration to all the factors which are likely to be involved in an inquiry for a pump: the time to do that is *during* the inquiry, before even a proposal is offered, and most certainly before the order is placed.

Hazards of Small Beginnings

Lack of information may bring minor troubles in the early stages of operation; unnoticed, these may build up to dangerous dimensions. For example, an inquiry may specify the pumping of a certain slurry of known specific gravity by means of an open impeller pump, for which a suitable material—stainless steel—has been suggested. A pump supplied to meet these requirements, and intended to deliver a specified number of gallons per minute, might on its trial run fail to pump the slurry and ultimately choke through settlement of solids. Investigation may disclose the fact that the suction pipe between feed tank and pump is too large for the capacity to be handled, and that this allows settling to take place in the suction pipe, thus clogging the system with the solids carried in the slurry. At the same time it may possibly be that the discharge pipe is too small for the desired pumping capacity, and that the resulting head is higher than anticipated.

On reducing the size of the suction pipe, and increasing the size of the discharge pipe, the pump will quite likely function perfectly, yet the system still gets choked at shutting down the pump, merely because no provision has been made for draining. To overcome this, the remedy is to introduce clear liquor into the suction pipe after the feed valve has been shut, so that this liquor clears the system of residual slurry every time the pump is shut down. The net result of all this has been to make the pump function for the service which was required; but if operating difficulties had been less serious in the first place, slighter irregularities might have permitted the pump to operate temporarily under difficulties, and then, without warning, a sudden choking of the pump might have coincided with other conditions to produce a dangerous situation.

Properly Worded Questions

As regards other hazards, the properly worded questionnaire can solicit information pointing to these, with such questions as: "Are any special precautions to be taken to avoid leakage of vapour from the liquid being pumped?" or "If the pump stops operating owing to sudden failure of electric current, will a hazardous situation arise in other parts of the process relying to be fed by the pump?" Even a very small leakage of a liquid which is highly volatile and inflammable must direct urgent attention to precautions for rendering the pumping installation immune to fire and explosion risks.

Leakage from the glands of the pump can evaporate very quickly to form an explosive gaseous mixture. Such a mixture of vapour and air will not be ignited by the sparking of the motor if a fully enclosed spark-proof

motor is installed, but it can certainly be ignited by static, which has tendency to be generated if the impeller revolves in a liquid with a relatively high factor of electrical insulation, and if dissimilar metals are used in the construction of the pump parts.

The construction of pumps which have to handle dangerous liquids should be considered as if invariably subjected to considerable pressure in operation, whether such pressure is actual or not. A heavy construction is preferable for high pressures where acids are to be pumped; the higher cost involved may be wise economy, since possible accidents can lead to compensation for injuries received by workmen. Special attention must be given to the design of glands; all risk of spurting acid must be avoided, yet even the most perfect gland cannot be immune from danger if maintenance of the gland is considered to be a matter needing only occasional attention. In every case there must be rigid adherence to a definite system of maintenance irrespective of whether the gland *is* actually giving trouble. When the trouble comes into evidence, maintenance is overdue.

A pump construction which avoids the passing of bolts through the gasket surface is preferable when the material of construction for the pump casing is one which is subject to concealed corrosion. Bolting must be adequate to provide the pressure necessary to prevent blowing of the gasket. There is also a particular need for avoiding vibration, especially when lead pipework is connected with the pump. Continuous vibration will eventually cause lead pipe to crystallise, and when that happens a disastrous breaking of one of the pipes is possible; if breakage occurs on the delivery pipe, the seriousness of the situation is far greater than if it is the suction pipe. Similarly, strains upon pipework must be avoided as far as possible, for they promote leakage at any pipe joint.

Provision of Guards

Wherever gaskets are under high pressure, or where a gland is not sealed or flushed, the provision of suitable guards over those parts of the pump is essential if safe operation is to be achieved. Sometimes it is desirable to provide a guard for the coupling between pump and motor; a preview of the environment will decide that point, yet at the relatively small cost of the guard its provision in all circumstances is wise.

Periodical inspection of bedplate and foundations is necessary where a corrosive liquid is being pumped. To continue to operate a pump upon a foundation which has much deteriorated by leakage of acid, or where the cast-iron bedplate or pump casing has been partially destroyed through the same agency, is not the way to keep free of accidents. The injury, however, may not be visible; it is equally possible that continuous leakage of liquid seeping beneath the foundations has caused cavitation of the earth by destroying organic matter present, which is then washed away. Serious injury may result from a sudden caving-in of the ground together with the pump foundation. The upheaval of foundations, however, is far more common than cavitation.

Evaluating Corrosion

As regards the general aspect of design for reducing or completely eliminating accidents, possible corrosion and heat damage have to be considered conjointly with the properties of available materials of construction. Corrosion is sometimes a difficult hazard to evaluate, in the absence of previous experience of the exact conditions applying in a pumping problem. But sometimes it may solve itself, as in metallurgical usage where a pump is to handle acid liquor from a brass-pickling process, the acid carrying an appreciable percentage of copper. Copper sulphate acts as an inhibitor against the corrosion of certain grades of stainless steel, and permits their use where alone they would be worthless for sulphuric acid. Sudden changes of temperature are also likely to wreck the suitability of a particular material. The pump may have to stand up against alternate contact with hot acid and cold acid, or perhaps—a more disastrous case—may have to pump cold wash water after hot acid. This dual service is a fairly common practice at certain works, especially in metal-pickling operations. It may even be desired to handle a strong alkali alternately with acid, a service that will be found very drastic when certain alloys are employed for the construction of the pump parts.

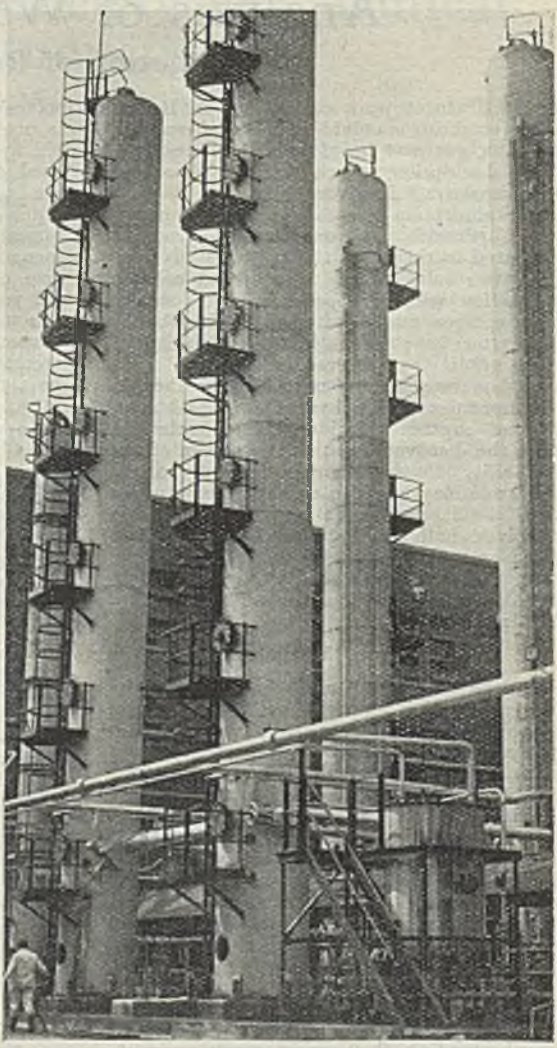
Recommendations by any one pump maker are usually restricted to the materials which he normally uses. Although the pump offered may prove quite suitable for the duty to be performed as regards the nature and peculiar characteristics of the liquid to be pumped, it does not always follow that such a pump gives complete satisfaction, because the servicing of it proves exceptionally high compared with alternative materials at a somewhat higher initial cost. The fact that more frequent maintenance is needed introduces another element of hazard, as one period of maintenance may be overlooked or is perhaps intentionally omitted for lack of time. In a rigid system of maintenance carried out conscientiously, this is avoided; yet the likelihood does arise, just as it is possible for a man to enter a closed vessel without the precaution of a life-line and a gas-mask.

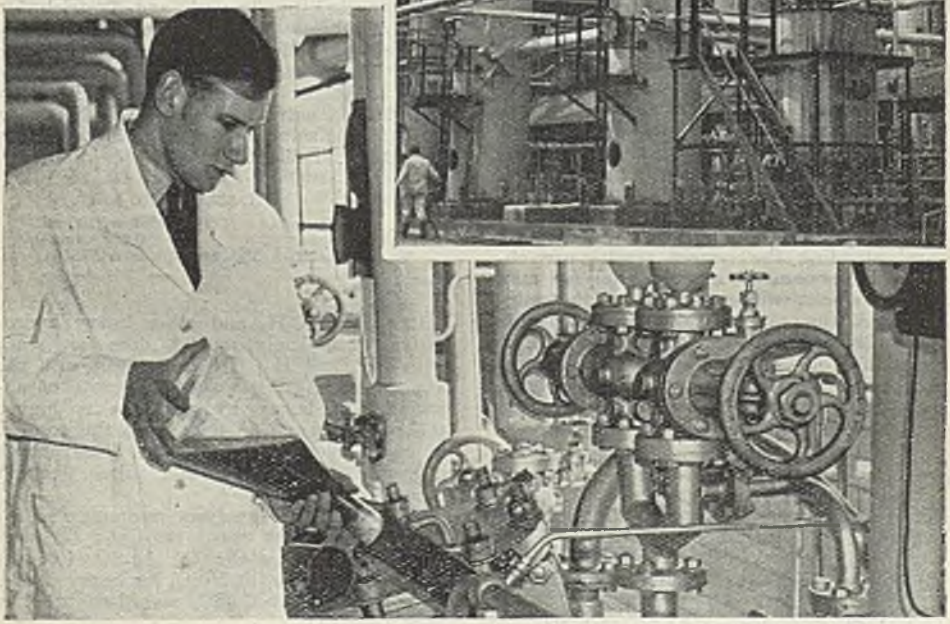
PENICILLIN ON SALE

As announced in THE CHEMICAL AGE last week (*see* p. 525), penicillin is about to become available, against a doctor's or dentist's prescription, to anyone who needs it. This week we were informed that as from June 1 the present free issue of penicillin by the Ministry of Supply through hospitals will cease and supplies will become available, through trade channels, in the form of dried powder packed in vials or ampoules containing 0.1, 0.2, 0.5 and 1.0 mega-units, with maximum retail prices fixed at 2s. 9d., 4s. 9d., 10s. 6d., and £1 respectively. Supplies will also be available in an oil-wax suspension for injection.

United Kingdom production of penicillin to-day is nearly 1000 times as much as in 1943. In the months of March and April this year it was respectively 178,000 and over 260,000 mega-units. Further increases are expected.

Right: Air-scrubbing towers at Speke penicillin factory, for purifying air in fermentation process. Below: Inoculating a "seed tank" with a culture.





Analysis of Water Gas

Investigation of Reagents

SOME recent work carried out in Russia to establish standard methods of analysis of water gas may be of general interest. A short description, taken from a paper by Zel'vyanskaya,* is given below.

The absorption of carbon dioxide by potassium hydroxide and oxygen by pyrogallol appeared to require little further study, and the latter solution was investigated only in connection with any possible effect on the main components of water gas and carburetted water gas; no noticeable solubility of these gases was observed.

Carbon monoxide is normally absorbed in an ammoniacal or a hydrochloric acid solution of cuprous chloride. These solutions have the disadvantage that, by reason of the instability of the complex formed, carbon monoxide may be given up to a sample under test. Furthermore, the ammoniacal solution dissolves both methane and hydrogen to some extent; thus, a gas containing 25 per cent. CH_4 and 5 per cent. CO was found to have an apparent CO content of from 5.45 to 6.86 per cent.

Pieters' Reagent

On the other hand, a reagent described by Pieters, cuprous sulphate and β-naphthol in sulphuric acid, appears to have no disadvantages. It absorbs CO completely in 4 min., whereas ammoniacal Cu_2Cl_2 requires 20 min. to absorb 97 per cent. of the CO in a gas containing 10 per cent. CO; and it has no action on CH_4 or H_2 even after 30 minutes' contact with the individual pure gases. The reagent may be prepared by adding gradually, with vigorous shaking, 20 g. of cuprous oxide and 25 g. of β-naphthol to a cold mixture of 200 ml. of conc. H_2SO_4 and 25 ml. of water. Tests with the reagent, using a gas containing 10 per cent. CO, show that the freshly-prepared solution gives low results (9.5-9.6 per cent.), but that after 2 days' standing the correct results are obtained. Between 15 and 20 analyses may be carried out without changing the solution and the rate of absorption remains practically constant throughout. The determination of CO is carried out after absorption of heavy hydrocarbons and oxygen, since these would be taken up, at least in part, by the reagent.

Tests for Heavy Hydrocarbons

Heavy hydrocarbons are normally determined by absorption in one of the following reagents: (1) conc. H_2SO_4 containing 5 per cent. silver sulphate; (2) bromine water; or (3) fuming H_2SO_4. The first of these dissolves CO and the last acts on paraffins and is not recommended for absorbing unsaturated hydrocarbons. Bromine water cannot be used satisfactorily when aqueous solutions are used as confining liquids. Various liquids have been recommended but it appears that the only satisfactory one is mercury. Table I shows results of successive double treatments of a gas containing 6.2 per cent. C_2H_4 and 93.8 per cent. N_2 as affected by the nature of the confining liquid. Reductions in vol. per cent. are given as —, increases as +. The total should, of course, be −6.2.

TABLE 1

Absorption of C_2H_4 by bromine water. Change of volume (%), after successive treatments, as affected by the nature of the confining liquid

Saturated $(NH_4)_2SO_4$	*Saturated* $CaCl_2$	*Saturated* $NaCl$	*Mercury*
−1.5	−5.1	−4.3	−4.9
−0.9	−1.6	+0.1	−1.3
+2.0	−0.6	+0.2	0.0
+1.0	+0.8	+0.5	0.0
+0.4	+0.4	—	—

Experiments with Silver Sulphate

The author's experiments with fresh 5 per cent. Ag_2SO_4 in H_2SO_4 show that 100 per cent. CO is absorbed to the extent of 38.8 per cent. in 40 min., with an additional 16.7 per cent. in a further 3 hours, though the relative amount absorbed is less in the case of the CO in water gas. Tests on a solution proposed by Tropsch and Dietrich for absorbing heavy hydrocarbons show that it can be thoroughly recommended for the purpose. The reagent is prepared by mixing 14 parts of 0.6 per cent. Ag_2SO_4 in H_2SO_4 with 1 part of a saturated solution of $NiSO_4$ in H_2SO_4. The solution has only a slight action on CO (*cf.* Table II).

TABLE 2

Concn. of CO %	*Time of contact* *min.*	*CO absorbed, ml/100 ml.* 5% Ag_2SO_4	0.6% Ag_2SO_4 + $NiSO_4$
100	25	28.2	4.5
10	25	1.5	0.15

It absorbs C_2H_4 and other heavy hydrocarbons completely, but it does not react with CH_4 and H_2. In comparison with the 5 per cent. Ag_2SO_4 reagent the rate of absorption of heavy hydrocarbons is higher (6.7 min. against 15 min.) and the cost is, of course, lower. It has the disadvantage of rapid aging and hence requires frequent renewing.

The scheme of analysis recommended is: (1) KOH (40 per cent.) for CO_2; (2) alkaline pyrogallol for O_2; (3) Ag_2SO_4 (0.6 per cent.) in H_2SO_4 with $NiSO_4$ for heavy hydrocarbons; and (4) Cu_2SO_4 and β-naphthol in H_2SO_4 for CO.

* R. ZEL'VYANSKAYA, *Trans. All-Union Conference on Anal. Chem.* (Acad. Sc., U.S.S.R.), 1944, III, 184.

The French Society of Chemical Industry

Thirty Years of Progress

THE Société de Chimie Industrielle, which is presided over to-day by M. Robert Bienaimé, is thirty years old. It was born during World War One, and in its comparatively brief life it has made important contributions to the progress of chemistry, and the development of its applications.

The Society was founded in 1917 by Paul Kestner and Jean Gérard. Its primary task was the establishment and maintenance of a close liaison between industry and research. Annual congresses were held in Paris, Marseilles, Bordeaux, Brussels, Strasbourg, Barcelona, Liége, Prague, Lille, and Nancy. At those congresses all who were interested in applied chemistry—technicians, business men, chemists—got together. A congress was due to have been held in Warsaw in 1939 at the moment when the German tanks and planes were occupied in reducing that unhappy city to rubble.

The congresses and the "Specialist Days" which followed them were known by the titles of the subjects discussed, and devoted to those matters; hence "Congress of Liquid Fuels," "Symposium on the Standardisation of Laboratory Glassware," and so on. A number of technical groups have been formed, or are in process of being formed, since the war ended, to study such matters as insecticides, plastics, perfumes, paint, and pharmaceutical preparations. Lunch-hour discussions are held monthly during the academic term. At these lunches some topic of general interest is broached. The Society, in fact, encourages by every possible means an active and co-operative interest in applied industrial chemistry throughout the whole field of industry and research.

International Congresses

The need for actively co-ordinating, on the international as well as on the national plane, all work directed towards the progress of pure or applied chemistry has been recognised by the Society since its earliest days. A National Federation of Chemistry Associations was established in 1919 largely as a result of the efforts and initiative of the French Society of Chemical Industry. A few months later an International Chemical Union was formed. It held sessions before the war successively at Rome, Brussels, Lyons, Cambridge, Copenhagen, Bucharest, Washington, Warsaw, The Hague, Liége, Madrid, Lucerne, and Rome again. At these meetings the world's foremost chemists used to meet and exchange ideas.

It is not only, however, in the scientific and technical field that co-ordination has been proved to be indispensable. It is needed just as much in the field of documentation. With this end in view the French Union of Documentation Societies was established in 1932 on the initiative of the Society of Chemical Industry. A scientist, technician, or industrialist derives enormous profit from the experience of his predecessors. It is for this reason that a well-run library and documentation centre is indispensable. In order to avoid duplication, it was arranged that the documentary reserves of the Society should be installed in the library of the Institute of Chemistry (Maison de la Chimie), which has been extended to include them. The library is open to consultation by all bodies affiliated to the Institute. The library of the Society of Chemical Industry therefore constitutes in effect to-day the library of the Institute of Chemistry.

Technical Improvement Centre

There is one particular form of documentation which is especially welcome to members of the senior ranks of scientific and industrial workers. This is the lecture based on experience gained daily by those who work in factories and laboratories. The Technical Improvement Centre, the foundation of which was inspired by the Society of Chemical Industry, organises regular lectures of this nature for young chemists. The purpose of these lectures is to bring home to young scientific workers the facts about the interdependence of all branches of research. The smallest measurable advance in any branch of research to-day is liable to have the widest repercussions. It is impossible for chemists to live in a vacuum and ignore what is going on in other fields of applied science. The number of these lectures and of those who attend them is constantly growing.

The Society is interested not only in technical improvements covering the higher categories of industrial and scientific personnel, but also in the workers in the chemical factories. The Technical Centre for Workers' Education was formed and is controlled by the Society. It has concentrated its attention on the practical knowledge which the factory worker requires, and on the reasons for the various rules and processes which he is called upon to follow.

In the courses which are organised by the Centre the reasons why these rules and processes have to be followed are made plain by numerous illustrations and examples. Similarly the need for working with precision and with method is made clear. Information is given about the various materials which are used by the chemical industries. The teachers at the Technical Centre were particularly active in encouraging the patriotic feelings of their students during the German occupation. The courses were due to start in October, 1939, but the defeat of the French armies and the subsequent temporary collapse of France resulted in their postponement until early in 1941.

Exhibitions

Before the war several exhibitions were organised by the Society, and all these were most successful. They were devoted to subjects such as Controlling and Recording Apparatus, Liquid Fuels, Dyes, Fertilisers, Corrosion, Plastics, Documentation. Special sessions held during the course of these exhibitions developed into congresses at which specialists got together and resolved important questions bearing on production. Films were shown and talks by experts were given. All this was aimed at encouraging prospective buyers of the classes of goods exhibited.

Educating the Consumer

Collective education of the consumer in the latest methods of applied chemistry constitutes an important aspect of the work of the Society of Chemical Industry. This work of popularisation is rounded off by the work of a body called the Association of Friends of the Institute of Chemistry. This body, likewise founded by the Society of Chemical Industry, has the task of making ever more widely known the social rôle played by chemistry in modern life, and the good effects which result therefrom. Two series of lectures open to the general public were held before the war in spring and autumn. The first dealt with great names in chemistry. The second with some particular aspect of their work. Diffusion of knowledge and ideas is carried out by two methods. The first method is by answering consumers' questions and demands; the second is by handing out information at regular intervals. Among chemistry periodicals *Chimie et Industrie* takes a leading place.

The work of the Society continued throughout the war under the most difficult and trying conditions. The Society made itself responsible for hiding documents which might have been of use to the invader; it tried also, so far it could, to hide and protect such of its members as were Jews or Freemasons. With regard to the future, the Society is full of hope and confidence.

German Technical Reports

Details from Latest Lists

APPENDED are details from the latest lists of industrial reports by the Combined Intelligence Objectives Sub-committee (CIOS); the British Intelligence Objectives Sub-committee (BIOS); and the Field Information Agency Technical, U.S. Group, Control Commission (FIAT).

CIOS VI—22. *X*—18, 22. *XV*—5. *The Fischer-Tropsch process* (2s. 6d.).

CIOS XXII—1. *Chemische Werke Huls A.G.*: Acetylene and styrene manufacture (1s.).

CIOS XXVIII—13. *Buna Werke-Schkopau A.G.*: Synthetic rubber plant (4s.).

CIOS XXXI—23. *Metallgesellschaft-Lurgi, Frankfurt-am-Main*: Wartime activities of interest to the oil industry (5s.).

CIOS XXXI—44. *F. Krupp A.G., Essen*: Heat-resisting and corrosion-resisting alloy steels (2s.).

CIOS XXXI—76. *The Leverkusen Works of I.G. Farben, Braunschweig*: Synthetic rubber research and testing laboratory. Experimental tyre plant (2s.).

CIOS XXXII—89. *Luftfahrtforschungsanstalt Braunschweig*: Research activities on fuels and lubricants (3s. 6d.).

BIOS 240. *Synthetic tanning agents and leather auxiliary products of the I.G. Farben* (3s. 6d.).

BIOS 331. *Amalia benzol refinery, Harpener Bergwerksverein, Bochum* (1s.).

BIOS 332. *Chemische Fabrik Weyl A.G., Mannheim-Waldhof*: Distillation of tar (1s. 6d.).

BIOS 333. *Winkler generators for manufacture of water gas, etc.* (4s. 6d.).

BIOS 341. *German Chemical Plant Manufacture*: Mixing and grinding machines (1s.).

BIOS 351. *Preparation of adipic acid from tetrahydrofuran and carbon monoxide* (6d.).

BIOS 354. *Translation of a report by Dr. Fikentscher and Dr. Herrle, Ludwigshafen*: Polyvinyl pyrrolidones (2s. 6d.).

BIOS 357. *Interview with Dr. Von Kutepow, Haupt Laboratorium, I.G. Farben, Ludwigshafen*: Propargyl alcohol, dehydration and oxidation to hexadienediol (1s.).

BIOS 360. *I.G. Farben*: Notes on manufacture of ethylene oxide (1s.).

BIOS 363. *Röhm und Haas A.G., Darmstadt*: Manufacture of "Plexiglas" and "Plexigum." Polymerisation of methyl methacrylate (4s.).

BIOS 372. *German tin smelting and allied industries* (5s.).

BIOS 398. *The German activated bleaching earth industry, with some observations on German Bentonite and Neuberg chalk* (2s.).

Butesin Picrate

Its Use in Antiseptic Dressings

by C. H. BUTCHER

CERTAIN derivatives of the aminobenzoic acids are of physiological interest, *p*-aminobenzoic acid, notably, deriving some importance from the fact that its esters have anæsthetic properties, although all aromatic esters are capable of inducing local anæsthesia in greater or lesser degree. Anæsthesin (or benzocaine), butesin, novocaine (or procaine), and butyn are salts of the ethyl, *n*-butyl, β-diethylamino ethyl, and γ-di-*n*-butylamino propyl esters of *p*-aminobenzoic acid. Both novocaine and butyn are useful substitutes for cocaine.

Butesin is a white crystalline powder, m.p. 55-57° C., which is tasteless, almost insoluble in water (0.00014 g. per 100 cc. at 20° C.), but soluble in dilute acids, alcohol, ether, chloroform, benzene, and fatty oils. Combined with picric acid it yields butesin picrate,

$$(C_6H_4.NH_2.COOC_4H_9)_2.C_6H_2.(NO_2)_3OH$$

containing 62 per cent. (two molecules) butesin and 38 per cent. (one molecule) picric acid. This product is a yellow amorphous powder, m.p. 109-110° C., which can be incorporated with neutral fatty oils and ointment bases. The powder is soluble in alcohol, ether, chloroform, benzene, and cottonseed oil, but only very slightly soluble in water (0.07 g. per 100 cc. at 20° C.). It is odourless, but has slightly bitter taste.

Combination of Properties

In the treatment of burns, butesin picrate finds advantage in combining the anæsthetic properties of the butesin with the antiseptic properties of the picric acid. It was first used in the United States about 15 years ago as a treatment for sunburn; later for the treatment of burns by fire or by heated objects. For ointments the powder is incorporated with the usual ointment bases; gauze dressings are impregnated with a solution in one of the solvents mentioned, which is subsequently allowed to evaporate and deposit the picrate upon the fibre. There is reference to its use in the *American Red Cross First Aid Text-Book*, and P. J. Hanzlip's *Handbook of Accepted Remedies*. Before the war there were two or more makers of the ointment in the United States, and others in Germany, the efficiency of butesin picrate in the treatment of burns and sunburn having apparently received attention in both countries simultaneously.

The continued use of butesin picrate for the treatment of sunburn, however, has given some trouble owing to the subsequent development of a mild form of dermatitis; the incidence has been reported to be 1 in 6000 cases. It is uncertain whether the dermatitis arises actually from the product itself, or because of sensitivity of the patient to picric-acid poisoning as distinct from poisoning by butesin; there are persons who are subject to one or other, or both.

Danger from Prolonged Use

Dermatitis is more likely to develop from prolonged use of the ointment in the treatment of sunburn, rather than in that of burns as occasion arises. There is certainly some advantage in using it in the treatment of burns when the flesh tissue is badly damaged, if only for the value of the local anæsthetic effect following application, apart from antiseptic properties. In cases of sunburn treatment there has been marked diffused dermatitis, such treatment being often applied by users without any caution or consideration. This has been most certainly noted on the Florida coast and other beaches where there is much sun-bathing; no doubt the incidence to dermatitis is increased in the presence of the sea air.

Investigations on *Dermatitis eczematosa* due to the use of butesin picrate have been reported by O. G. King (*West Virginia Medical Journal*, 1938, *34*, 28), who supplies the figure of incidence of 1 case in 6000 already mentioned. He mentions a particular case where the ointment was applied to a burn on the elbow and the resulting dermatitis caused loss of work for 50 days; here there was a special sensitivity towards picric acid, as revealed in a study of patch tests. For another case, in connection with sunburn, there was a particular sensitivity to butesin, while the person was negative in reaction to picric acid. It did not seem likely that butesin picrate had any composite bad property distinct from those of the components butesin and picric acid.

An Increasing Tendency

Considering the various alkyl aminobenzoates which have been prepared, L. Stambovsky (*Drug and Cosmetic Industry*, 1935, *37*, 175, 192) has reported that there is an increasing tendency to set up epithelial irritation in proportion as the alkyl radical increases in molecular weight, *i.e.*, it is greater for the butyl derivative than for the propyl, and again greater for the propyl than for the ethyl ester; the ethyl derivative is already listed as an unofficial local anæsthetic under the name of benzocaine. There is also increased difficulty and

expense in manufacture as the molecular weight of the alkyl radical increases.

U.S. Pat. 1,708,712 (Volwiler and Tabern, assigned to Abbott Laboratories, 1929) relates to antiseptic anæsthetic compounds. Into such a group must be placed butesin and related alkyl esters of *p*-aminobenzoic acid. There is reference in this patent to butesin (butyl *p*-aminobenzoate) combined with halogenated aromatic sulphonic acids containing a phenolic OH group. Among examples given are 2,6-di-iodophenol-4-sulphonic acid, 2,6-di-bromophenol-4-sulphonic acid, and 7-iodo-8-hydroxyquinoline-5-sulphonic acid, all of which have combined local anæsthetic and antiseptic properties of advantage in the treatment of burns. These products are obtained by mixing solutions of the reacting substances, and separating the crystals which form.

C. F. Lanwermeyer (*J. Amer. Pharm. Assoc.*, 1931, *20*, 891) has reported incompatibilities of butesin, among other products. T. D. Gerlough (*J. Pharmacol.*, 1931, *41*, 307) states that the duration of anæsthesia by butesin picrate is unaffected by changes in *p*H value. A Leulier and J. Dinet (*J. Pharm. et Chimie*, 1928, *8*, 57) deal with the bromination of *p*-aminobenzoic acid and its ethyl and butyl esters, some of which are more soluble than butesin and show no increased toxicity.

Oxyacetylene Cutting

Chemistry of the Process

OXYACETYLENE cutting is primarily a chemical process, based on the remarkable affinity of oxygen for ferrous metals raised to ignition temperatures (approximately 750° to 875° C.). When commercially pure oxygen is brought into contact with most steels or iron, at red heat, a very active chemical reaction results. The oxidation of the metal proceeds with great rapidity. In addition to the chemical reaction there is an appreciable mechanical eroding effect produced by the kinetic energy or motive power of the cutting jet, which washes away some of the metal in unconsumed metallic form. As a result of the oxidation of the iron, a black, brittle substance is formed identical with magnetic ore or hammerscale, but different from red iron oxide, commonly known as rust. This substance contains a smaller proportion of oxygen than rust, and is known as magnetic iron oxide or black iron oxide, having the chemical formula Fe_3O_4.

In the oxidation reaction, 1593 calories per gram or 2870 B.Th.U. per lb. of iron are produced, which is known as the calorific energy of the iron. One pound of oxygen will oxidise or consume 2.618 lb. of pure iron. Oxygen, at 21° C. and 1 atm. pressure, has a volume of 12.07 cu. ft. per lb. and pure iron weighs 0.285 lb. per cu. in.

Based on these constants, the following data may be computed:

(a) 1 lb. oxygen will oxidise 2.618 lb. or 9.186 cu. in. of pure iron.

(b) 1 cu. ft. oxygen will oxidise 0.217 lb. or 0.761 cu. in. of pure iron.

(c) 1 lb. of pure iron requires for oxidation 0.382 lb. or 4.610 cu. ft. oxygen.

(d) 1 cu. in. of pure iron requires for oxidation 0.109 lb. or 1.314 cu. ft. of oxygen.

In actual practice, the iron removed from the kerf is not entirely consumed by the oxygen, but, because of the eroding effect of the cutting oxygen jet already mentioned, about 30 to 40 per cent. of the metal is washed out, as unconsumed or metallic iron: Owing to this fortunate circumstance, it is not uncommon to obtain satisfactory cuts with a cutting oxygen consumption of even somewhat less than 1 cu. ft. of oxygen per cu. in. of material removed from the kerf.

Assuming 65 per cent. of the iron to be oxidised Fe_3O_4, the heat generated by the reaction in the cut will be 1865 B.Th.U. per lb. or 531.7 B.Th.U. per cu. in. of metal removed from the kerf. This is at least twice as much heat as is supplied by the preheating flames in ordinary light cutting and the ratio increases rapidly with the thickness.

Carbon, manganese, silicon, and other elements present in combined form in ordinary steels are in such minute proportions as to have little or no influence on the chemistry of oxyacetylene cutting. However, certain alloy steels contain chromium, nickel, and other elements in sufficient amounts to have a marked retarding effect on the oxidation reaction. The uncombined or graphic carbon in cast iron has a similar influence. Such materials are harder to cut and special techniques are required.

IRON AND STEEL EXPORTS

Exports of iron and steel from the U.K. in March reached 211,344 tons, valued at £6,674,700, compared with 189,467 tons, valued at £6,120,600 in February. The monthly average for 1938 was 163,287 tons, worth £3,562,000. Exports in March exceeded the 1938 level by 29.5 per cent. in tonnage and 87.4 per cent. in value.

"The iron and steel industry is thus the first of the great industries of the country to have exceeded the 1938 volume of exports in each month of this year," states the monthly Statistical Bulletin of the British Iron and Steel Federation, which furnishes these figures. "It accounted for 10 per cent. of the total value of all exports from the United Kingdom in the first quarter of 1946, compared with 9 per cent. in 1938."

Personal Notes

DR. N. BOOTH, principal scientific officer of the Gas Research Board, has been appointed research manager to the British Oxygen Co., Ltd.

PROFESSOR FREDERIC JOLIOT, head of the National Centre for Scientific Research in Paris, was elected on May 9 to the Foreign Membership of the Royal Society.

PROFESSOR H. D. KAY, director of the National Institute for Research in Dairying, has succeeded Professor B. T. P. Barker as chairman of the Microbiological Panel, Food Group, S.C.I.

PROFESSOR CHENEVARD, of the Paris Mining Academy, author of a number of works on steel alloys, has been elected a member of the French Academy of Sciences to fill the vacancy caused by the expulsion of M. Georges Claude.

PROFESSOR C. H. LANDER, C.B.E., Professor of Mechanical Engineering, Imperial College of Science and Technology, is president-designate of the Institute of Fuel for the year beginning October 1, when he will succeed Dr. E. W. Smith.

PROFESSOR W. E. S. TURNER, who will retire from the position of hon. general secretary of the Society of Glass Technology on May 31, will be succeeded by DR. J. H. PARTRIDGE, of the General Electric Co., Ltd., research laboratories.

DR. G. M. BENNETT, Government Chemist, has been selected as one of the members of the Royal Commission which has been set up, under the chairmanship of Lord Justice Cohen, to determine what awards should be paid to inventors in respect of the user of their inventions, etc., by Government departments during the war.

The Governors of the Heriot-Watt College, Edinburgh, have appointed DR. HUGH B. NISBET, D.Sc., Ph.D., F.R.I.C., to fill the post of Professor in the Chemistry Department. Dr. Nisbet has been Lecturer in Fuel Technology in the Department since 1942, and was Lecturer in Chemistry from 1921. In 1934-1937 he was hon.-secretary of the Scottish Development Council of Oil from Coal, and in 1943-1945 was a member of the Scottish Fuel Efficiency Committee.

MR. K. B. JONES, who has taken up the appointment of chief chemist for the Rhodesian Iron and Steel Commission in Bulawayo, South Africa, was formerly chemist to Sheepbridge Stokes Centrifugal Castings Co., Ltd., Chesterfield, and later moved to Staveley Coal & Iron Co., Ltd., where he remained until 1941. After gaining his Associateship in Metallurgy at Sheffield University, he moved to Corby, Northamptonshire, continuing in this position until he secured his new overseas post.

Obituary

MR. JOHN ADDYMAN GARDNER, M.A., F.R.I.C., who died at Bradford on May 13, aged 78, had been an F.R.I.C. for over 50 years, having received his Fellowship in 1895.

MR. JOHN HEWITT, of Totteridge, Herts., who died suddenly at Sydney, New South Wales, on May 8, was chairman of Goode Durrant & Murray, Ltd., chemical and general exporters.

DR. EDMUND BRYDGES RUDHALL PRIDEAUX, M.A., D.Sc., F.R.I.C., who died at Bournemouth on May 8, was for many years Reader in Inorganic and Physical Chemistry at University College, Nottingham. He served as vice-president of the Nottingham Section of the Society of Chemical Industry in 1942-43.

New Control Orders

Iron and Steel Products

THE Control of Iron and Steel (No. 48) Order, 1946 (S. R. & O. 1946, No. 639), which amends the Control of Iron and Steel (No. 46) Order, 1945, removes the restrictions on the acquisition of ores, concentrates, and residues containing molybdenum, niobium (columbium), tantalum, or vanadium; ferro alloys (other than spiegeleisen smelted in a blast furnace, and ferro-manganese smelted in a blast furnace); calcium silicide; tungsten metal powder, sintered lumps, or scrap; titanium carbide; cemented carbide hard metal, molybdenum metal powder or scrap; any chemical compound of molybdenum or tungsten or vanadium; carbon electrodes; cinder and scale; and various wire products.

Reductions are made in the maximum prices of ferro tungsten (6s. 10d. to 6s. per lb.), and tungsten powder (7s. 4½d. to 6s. 7½d. per lb); high speed steel and substitute high speed steel; and certain other steel products; and increases are made in the maximum prices of shell steel wire rope, and certain other qualities of steel products. The Order came into force on May 13.

An interesting feature of a visit last week to the Post Office Research Station, Dollis Hill, London, N.W.10, was a demonstration of the various processes in the production of quartz crystal vibrators, from the selection and cutting of the natural crystal to the precision adjustment and mounting of the finished unit. The crystal, before being cut, is examined for flaws by being immersed in a tank of water, one side of the tank being provided with a glass window, through which a beam of intense electric light is projected on to the specimen.

Parliamentary Topics

Zinc Stocks

IN the House of Commons last week, Mr. Marples asked the Minister of Supply whether he was aware that stocks of virgin zinc fell from 175,900 tons in June, 1945, to 128,400 tons in February, 1946, and whether he was satisfied that the reduced stocks held in February, 1946, were sufficient for the requirements of the country.

Mr. Wilmot said he was satisfied that both the stocks of zinc and the arrangements made for maintaining them were satisfactory; and when Mr. Marples, remarking that he did not share the Minister's optimism, drew his attention to the fact that stocks had dropped still further, Mr. Wilmot said that we did not maintain such heavy stocks as during the war because supplies were now open which had then been closed.

Paint Industry Raw Materials

Mr. Bossom asked the President of the Board of Trade why raw materials in short supply—lithopone, lead chromate colours, and oxides of iron—were being exported by this country at this time.

Mr. Belcher replied that limited exports of lithopone were made to preserve an export trade of value to this country, and to meet the essential needs of countries with no other source of supply. In view of the home demand, however, these exports were being reduced. Lead chromate colours had not been in short supply, and supplies of the variety of iron oxide in respect of which some difficulty had been experienced were now coming forward.

Mr. Bossom: Would the Parliamentary Secretary mind inquiring of the industry and finding out that their reply is not the same as his?

Mr. Belcher: I have no objection to making further inquiries, but I have no reason to believe that the information I have given does not represent the true facts.

Mr. Bossom asked what steps the President of the Board of Trade was taking to ensure that the manufacturing capacity of the paint industry in Great Britain was capable of manufacturing all the paint required for both the domestic and export markets when the essential raw materials become available.

Mr. Belcher said he was advised that the manufacturing capacity of the paint industry would generally be sufficient to meet all demands as raw materials and labour became available.

Mr. Bossom: Can the Parliamentary Secretary give any indication when that date will arrive?

Mr. Belcher: The hon. Member probably knows that the paint industry is suffering from a worldwide shortage of linseed oil. I could not possibly estimate when linseed oil will be available.

Mr. Bossom: In other words, the Parliamentary Secretary knows nothing about it.

Colonel J. R. H. Hutchinson asked the President of the Board of Trade whether there was any improvement to report in the supplies of linseed oil needed for the paint and linoleum industry.—Mr. Belcher: No, sir.

China Clay Industry

Mr. King asked the President of the Board of Trade what steps had been taken to implement the recommendations of the committee which reported, some months ago, on conditions in the china clay industry.

Mr. Belcher said that this committee made certain recommendations with regard to short-term problems and also proposed that a working party should be set up to handle long-term problems. The appointment of the working party was announced on April 30 and they have had their first meeting.

The position on the short-term matters is as follows: Since the beginning of the year, the labour force in the industry has been increased by 215 workers. The first batch of 150 German prisoners of war should arrive during this month and I hope that at least another 150 will be available in June. Class B releases for 107 men, who are all that can be obtained by this means, have been applied for. As regards timber, machinery, filter cloths, and fuels for drying clay, the appropriate departments and controls have been given particulars of the full needs of the industry and are doing everything they can to speed up supplies. The Ministry of Food has been making arrangements with the producers to provide better food for the workers in the middle of the day.

CHINA CLAY WORKING PARTY

The working party for the china clay industry, appointed by the President of the Board of Trade (*see* THE CHEMICAL AGE, March 16, 1946, p. 289), has begun its work.

The terms of reference are: "To examine and inquire into the various schemes and suggestions put forward for improvements of organisation, production and distribution methods and processes in the industry, and to report as to the steps which should be taken in the national interest to strengthen the industry and render it more stable and more capable of meeting competition in the home and foreign markets."

Any person or organisation interested and wishing to submit suggestions or evidence should write to the Secretary, China Clay Working Party, Neville House, Page Street, London, S.W.1.

Spanish Industrial Projects

Synthetic Fuels and Metals

IN view of recent speculations regarding the future of the Spanish régime, the following details about the country's industrialisation are of particular interest. It is reported that at Escatrón, Zaragoza, the construction has begun of a lignin-based synthetic fuel plant with a planned annual output of 100,000 tons. This plant forms only part of a larger industrial scheme, which includes also construction of a power plant with an annual capacity of 100,000 kWh, and installation of mining equipment to increase output of lignin to one million tons yearly.

At Valladolid, a private group is constructing an aluminium plant. According to reports, it is being advised in technical matters by a French group. At Ponferrada, works are being built to make possible the production of about 200,000 tons of pig-iron, while in the Sierra de Almagrera operations have been resumed in the lead mines.

What is a "Spinel?"

A Feature in Ceramic Colours

IN his interesting lecture on "Coloured Bodies," delivered to the Pottery Managers' and Officials' Association at Hanley,* Dr. Felix Singer gave a valuable description of that mineral, so important in ceramic chemistry, the spinel.

In answer to a question, in the discussion following the lecture, Dr. Singer said that "spinel" was a term which had been applied originally to a mineral with the chemical composition $MgO.Al_2O_3$ which was found in nature in regular crystals, and in very different colours. Later the expression was extended to similar crystals in which the MgO was partly or completely replaced by other monoxides while the Al_2O_3 could be replaced by other sesquioxides. All monoxides might not enter the crystals, because the atoms might be either too small or too large. There were about a dozen monoxides and a dozen sesquioxides which, heated together, after very fine grinding would develop spinels; and there were tremendous opportunities for using very different coloured spinels to colour ceramic bodies.

In the course of the lecture Dr. Singer had explained that many ceramic stains were made in accordance with the spinel formula, more suitably entitled the "spinel structure." If monoxides like MgO, MnO, FeO, NiO, CoO, CuO, ZnO, CdO and sesquioxides like Al_2O_3, Ga_2O_3, Cr_2O_3, Mn_2O_3, Fe_2O_3, V_2O_3, Ti_2O_3 and Rh_2O_3 are ground together in the molecular ratio and the thorough mixture heated in a suitable ways, spinels are developed. By this means certain mixtures of monoxides may be combined with a mixture of sesquioxides and by these combinations an unlimited number of stains developed.

Not the spinel formula but the "spinel structure," is the decisive factor, because quite a number of combinations with similar formulæ, like $BeAl_2O_4$ and $CaAl_2O_4$, are not spinels because the ion of Be is too small and the ions of Ca, Sr and Ba are too large to enter the spinel structure. On the other hand, compounds with a spinel structure are formed when certain monoxides and dioxides react with each other, *e.g.*, Mg_2TiO_4, Mg_2SnO_4, Zn_2TiO_4, Fe_2TiO_4, Ni_2GeO_4, Ni_2TiO_4, Ni_2SnO_4, Ag_2MoO_4.

Most of the oxides mentioned are chromophores, but all the other oxides, in themselves white or nearly white, exert a great influence on the development of colour.

In addition to these genuine constituents of coloured spinels, quite a number of other compounds react as catalysts. This is most important because the development of spinels is often not so easy as the theoretical equation would lead one to assume. On the other hand, it is most important that the spinel structure should be really and fully developed without any lattice disturbance because it is this crystal structure which, more than any other compound, resists the chemical attack of the ingredients of ceramic bodies.

* Reprinted by the Author from *The Pottery Gazette and Glass Trade Review* (1946, p. 27), as Communication No. 122.

General News——From Week to Week

"Hints to Business Men Visiting India, Burma and Ceylon," is the title of a booklet just issued by the Department of Overseas Trade.

Employees of the Anglo-Iranian Oil Company who wish to travel by air between Britain and the Persian Gulf will in future be flown in aeroplanes of a new air transport company entitled Skyways Limited.

Pig iron output in the U.K. increased further last month, the annual rate of April production being 7,732,000 tons a year, compared with 7,154,000 tons for April, 1945.

British steel production for April was at the rate of 13,111,000 tons a year, compared with a rate of 12,302,000 tons last year. The decline compared with March due to the Easter holiday was less this year than last.

Expansions of the Departments of Chemical Engineering and Coal Utilisation at Birmingham University are being planned, according to a statement recently made by the Principal, Dr. Raymond Priestley.

A request by the Pharmaceutical Society of Great Britain to the Governors of the Heriot-Watt College, Edinburgh, to institute an independent department in pharmacy, has been referred to a committee for consideration.

An article in *The Municipal Journal* for May 3, dealing with extensive municipal gas reconstruction schemes at St. Helen's, home of the British heavy glass industry, states that the glass industry still takes about 45 per cent. of the town's gas output.

A cargo of 9600 tons of Malayan rubber, which reached Liverpool recently, was the largest single consignment of rubber to come to this country. In the past six months, more than 70,000 tons of raw rubber, valued at about £8,000,000, have been handled at Liverpool.

The first post-war British Industries Fair is to be held in May, 1947, in three sections —at Earl's Court, Olympia, and Castle Bromwich. This announcement was made last week by Mr. A. Mullins, Comptroller-General of the Export Promotion Department, Board of Trade.

The Scottish Tourist Board has announced that a new anti-midge lotion (in the creation of which a number of Scottish entomologists co-operated) is now being produced by a group of large manufacturing chemists, and will be on sale during the summer months all over Scotland.

"By way of explanation to their clients and as a reminder of wakeful nights and busy days," Baker Perkins, Ltd., Westwood Works, Peterborough, have just issued an admirably-produced portfolio, which, with lavish illustrations (many in colour) and clear text, makes known a record of wartime achievement of which they may justly be proud.

The latest paper issued from the Water Pollution Research Laboratory of the D.S.I.R.—*Animal Life in Percolating Filters* (H.M.S.O., 9d.)—was published at the request of many managers of sewage-disposal works. It comprises brief descriptions and excellent photographs of the more important macroscopic organisms in percolating filters; these play an important part (in larval form) in preventing the choking of the filter by "biological film," but can often give rise to a number of winged adults sufficient to cause a nuisance in the neighbourhood of sewage-disposal works.

A grant of £500 to Cambridge University for the academical year 1945-46 has been made by Bakelite, Ltd., for the encouragement of chemical research under the direction of Professor E. K. Rideal.

A start has now been made on the erection of the I.C.I. factory at Billingham for the manufacture of nylon polymer. The works will comprise factory buildings and plant structures, administration and process offices, process laboratories and amenities, with roads and railways. The contractors are Brims and Co., Newcastle-on-Tyne; the Cementation Co., Ltd., Doncaster; and J. Gerrard and Sons, Ltd., Manchester.

I.C.I. have revised the lay-out plan for the erection of new works on the Wilton Estate near Redcar, following complaints by residents against the close proximity of factory buildings to the houses. The firm has now announced that the main railway grid and boiler plant will be built on another site well away from the houses. The new works are intended to manufacture a wide range of chemical products.

Foreign News

All restrictions on the purchase and use of butyl synthetic rubber in Canada have now been removed.

Phosphates from Christmas Island, a British possession 222 miles south of Java, are being shipped to Western Australia.

The first fair to take place in Czechoslovakia after the country's liberation will be held at Prague from September 15-22.

Exploratory work is being carried out by oil experts in the area of the Vienna municipality.

The Belgian Ministry of Economy has fixed the following maximum prices for sulphuric acid: 60° Bé: 66 fr. per 100 kg., 66° Bé: 92.10 fr. per 100 kg. and alum 111.75 fr. per 100 kg. ex works, delivered in tank-car.

Trade agreements have been concluded by Belgium and Luxembourg with Norway and with Denmark, in accordance with which Belgian chemical and metallurgical products, etc., will be exchanged with Norwegian fish products and wood products, and with Danish dairy and horticultural produce, etc.

Washington has been warned (states a brief note in the *Daily Express*) that unless Britain releases some of her creosote stock to America, large quantities of poles, railway sleepers and piling may be lost. Creosote shipments from Britain were stopped after Lease-Lend ended.

The presence of radio-active elements has been established near the small tin-mining town of Boussac, in the Creuse Department of Central France. Active research is reported to be in progress.

Tin production in Portugal totalled 612 tons in 1945 against 346 tons in 1944. The only steadily producing mine is the Gaia mine; the Tuella mine re-started operations in May last, but these had to be suspended later on. At the Lagares mine, a concentration plant is being installed.

A scientific conference commemorating the 60th anniversary of the Royal Belgian Engineering and Industrial Society is being held this week (May 13-19) at the Palais des Beaux-Arts, Brussels. The opening address was delivered by M. Joliot-Curie, and other speakers include Sir Edward Appleton and Dr. Desch.

In order to free herself of the necessity of importing chemicals, China has a fixed programme for the development of a chemical industry based on her natural resources, according to a statement made by Mr. A. F. Goedicke, a New York chemical engineer, in an interview at Montreal on his return from a visit to China. The Nanking Government had sought his advice on the subject.

In Japan at present there are 17 sulphate of ammonia plants, but production is negligible because of destruction from bombing during the war, because they are otherwise in need of repairs, and because of general inertia, acording to Dr. A. R. Mer of the Chemicals Division of the U.S.A. Tariff Commission, who recently returned from an inspection of Japan.

One of the experimental piles at Oakridge, Tennessee, used for controlling the speed of disintegration of U^{235}, is now being converted to operate at high temperatures, presumably with a view to raising steam for industrial power, probably within the next year or two. This announcement was made by Dr. T. E. Allibone (for two years a member of the Anglo-American team working on the atom bomb) in the course of the Faraday Lecture presented to the Institution of Electrical Engineers in London on May 9.

Forthcoming Events

May 21. Association of Supervisory-Staffs and Engineering Technicians. Central Hall, Westminster, London. Mr. Herbert Morrison, M.P., Mr. Ian Mikardo, M.P., Mr. Julius Silverman, M.P.: "The Government's Prosperity Campaign."

May 22. Society of Chemical Industry (Chemical Engineering Group). Waldorf Hotel, Aldwych, London, W.C.2, 12 noon. Annual general meeting, followed by luncheon; address by Dr. H. Levinstein.

May 23. Mineralogical Society. Rooms of the Geological Society, Burlington House, Piccadilly, W.1, 5 p.m. Mr. J. M. Fleming: "Mica as a Munition of War."

May 23, 24 and 25. Society of Dyers and Colourists. The University, Leeds, 10.30 a.m. Symposium on Fibrous Proteins, Natural and Synthetic (*see* THE CHEMICAL AGE, April 20, 1946, p. 422).

May 23. Society of Chemical Industry (Plastics Group). Stewart's Restaurant, 50 Old Bond Street, London, W.1, 5 p.m., annual general meeting; 5.45 p.m., evening meal. Burlington House, Piccadilly, London, W.1, 7 p.m. Mr. N. J. L. Megson and Mr. A. K. Unsworth, with Mr. V. E. Yarsley and Mr. W. J. Grant: "The Tropical Behaviour of Cellulose Acetate Films."

May 24. Royal Institution of Great Britain. 21 Albemarle Street, London, W.1, 5.15 p.m. Sir Lawrence Bragg: "X-ray Analysis in Research and Practice Today."

May 24. Oil and Colour Chemists' Association (London Section). Manson House, 26 Portland Place, London, W.1, 6.30 p.m. Mr. H. G. Jones: "Some Physico-Chemical Aspects of Plasticiser Action."

May 28. Society of Instrument Technology. London School of Tropical Medicine, Gower Street, London, W.1, 7 p.m. Dr. A. Porter: "The Design of Automatic and Manually-operated Control Systems."

May 29. Royal Society of Arts. John Adam Street, Adelphi, London, W.C.2. Maj. W. H. Cadman: "Colloidal Carbon."

May 29. British Chemical Plant Manufacturers' Association. Connaught Rooms, Great Queen Street, London, W.C.2, 12.45 p.m. Luncheon.

May 30, 31, June 1, 2. Society of Chemical Industry (Food Group). Summer meeting in Scotland (*see* THE CHEMICAL AGE, 1946, *54*, 409).

May 31. Oil & Colour Chemists' Association (Bristol Section). Grand Hotel, Broad Street, Bristol, 1, 6.15 p.m. Mr. E. V. Colman: "What the decorator wants from the paint chemist."

Company News

Newton Chambers & Co., Ltd., announce a final dividend of 10 per cent., making 15 per cent. (same), on preference and ordinary shares, gross profit for 1945 having totalled £217,524 (£249,809).

British Match Corporation report a net balance of £349,576 (£347,240) for the year ended April 30 last. The final ordinary dividend of 5¼ per cent., plus bonus of 1 per cent., makes 9 per cent. (8 per cent.)

Ayrton, Saunders & Co., Ltd., are again paying ordinary dividend of 10 per cent. Net profit for 1945 is given as £16,991 (£23,398).

The International Nickel Co. of Canada have now published full accounts for 1945, showing net profit of $25,010,938 ($26,927,652). A dividend of $1.60 will be paid on common shares, this being the same as for 1944.

Sternol, Ltd., earned net profit of £11,930 for 1945, as against £9,332 in 1944. A sum of £12,900 is allocated to the payment of arrears on preferred ordinary shares for two years to December 31, 1941, and £6,575 is carried forward.

British Tar Products, Ltd., has announced that an extraordinary general meeting of the company is to be held on June 4, to authorise the return to the stockholders of 2s. 6d. per 5s. stock unit of issued preferred and ordinary stock. The balance-sheet at September 30, 1945, it is stated, disclosed a surplus of current assets over current liabilities of £256,320, and this sum is considered to be largely in excess of the working capital required.

Commercial Intelligence

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

Mortgages and Charges

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

JOHN PRENTICE (LONDON), LTD., chemical and dye products merchants. (M., 18/5/46.) April 18. £900 and £200 debentures, parts of a series already registered. £300. December 26, 1945.

New Companies Registered

Pyrometer Services, Ltd. (24,088).—Private company. Capital £500 in £1 shares. Suppliers of pyrometric equipment. Subscribers: J. C. Young, 3 High Street, Paisley; G. Barr.

British Colloids, Ltd. (409,251).—Private company. Capital £100 in £1 shares. Chemists, etc. Directors: R. C. Kelly, W. J. Wilson, C. C. Looker. Registered office: Crookes Laboratories, Gorst Road, Park Royal, N.W.10.

Paramount Plastic Products, Ltd. (409,872).—Private company. Capital £5000 in £1 shares. Manufacturers of plastic articles and products, chemical manufacturers, etc. Directors: Harry Frankel, N. G. Phillips, 57 Victoria Road, W.8.

G. Knowles (Chemists), Ltd. (409,479). Private company. Capital £1000 in £1 shares. Consulting, analytical, manufacturing, pharmaceutical and general chemists, etc. Directors: J. J. Shingler, F. J. Reynolds. Registered office: 305 Monument Road, Birmingham, 16.

Burgess Dow, Ltd. (409,203).—Private company. Capital £5000 in £1 shares. Consulting, analytical, manufacturing, pharmaceutical and general chemists, etc. Directors: A. Aldington, L. C. Laxton, J. Thompson. Registered office: 518 Hornsey Road, N.19.

Neoplas, Ltd. (409,510).—Private company. Capital £2000 in £1 shares. Manufacturers of and dealers in plastics, natural and synthetic resins, organic and inorganic chemicals, etc. Subscribers: P. Anderson, V. G. Ward. Registered office: 31 Curzon Street, W.1.

Deodant, Ltd. (409,214).—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in insecticides, spraying fluids, vermin destroyers, disinfectants, chemicals, gases, salts, acids and fertilisers, etc. Directors: W. A. Roberts, A. S. Ketcher. Registered office: 43 Queen Street, Blackpool.

Genaben, Ltd. (409,480).—Private company. Capital £10,000 in £1 shares. Manufacturers of and dealers in foods and medicines or combinations of foodstuffs and drugs and chemical and chemical substances, etc. Directors: F. G. C. Fison, A. G. Barthel, G. M. Dyson, T. H. Benger, B. D. Thornley, A. F. Lawry. Registered office: 43 Regent Street, Loughborough, Leicester.

Stedway Products, Ltd. (409,433).—Private company. Capital £2000 in 1000 7 per cent. cumulative preference shares of £1, 800 6 per cent. participating preference shares of £1 and 4000 ordinary shares of 1s. each. Manufacturers of and dealers in plastics, thermoplastics, cellulose acetate, etc. Subscribers: H. A. Snelling, Miss E. I. McMillan. Registered office: 18 St. Marks Hill, Surbiton, Surrey.

Chemical and Allied Stocks and Shares

REFLECTING the stimulus of the latest American loan news, stock markets developed exceptional activity, dealings on Monday reaching the record level of 18,878. British Funds continued their upward movement, and outstanding in a general rise in industrials was a further rally in iron and steels on the continued belief that prices had

recently been unduly reduced. Colliery shares attracted in view of the large yields offered, while an all-round rally in home rails was a good feature. Shares of industrial companies with debentures which can be converted to a lower interest basis have been favoured, following removal of the ban on conversion operations in respect of stocks carrying 4 per cent. interest or under. More hopeful export trade news also assisted sentiment, as did satisfaction with financial results that have come to hand.

Imperial Chemical rose further to 45s. on the full results and the strong financial position shown by the accounts. Turner & Newall rose to 90s. 3d., while elsewhere Lever & Unilever were higher at 54s. 4½d. awaiting news of the dividend equalisation agreement with the Dutch Lever N.V. B. Laporte were 98s. United Molasses at 53s. recovered most of the decline which followed recent market disappointment with the unchanged dividend; while Wall Paper Manufacturers deferred moved up to 45s., and Dunlop Rubber were good at 60s. 3d. on talk of an increase in the forthcoming dividend. Elsewhere, Triplex Glass rose to 43s. Borax Consolidated were 47s. 3d. and paint shares remained in favour, particularly Pinchin Johnson which showed a fresh advance to 47s., with Goodlass Wall 33s. and International Paint 135s. Higher dividend possibilities advanced Distillers to 124s. 6d. Associated Cement were good at 67s. 3d., while other shares in the building group generally moved in favour of holders. Crittall Manufacturing being 30s. 6d., and British Plaster Board 37s. 3d. British Aluminium continued their better trend and were 42s. 3d. British Oxygen were 98s. 9d., and General Refractories advanced to 21s. 7½d. Imperial Smelting were 19s. 3d. and British Glues & Chemicals 4s. shares have been favoured up to 14s. 7½d. Barry & Staines also rose to 60s. 3d. and Nairn & Greenwich to 86s. 3d. British Industrial Plastics 2s. shares attracted attention around 10s.

The recovery in iron and steels continued on the view that prices had been marked down excessively on nationalisation developments. it was pointed out that only some sections of the industry are under the threat of the latter. Babcock & Wilcox were firm at 63s. xd., Firth & John Brown rallied to 51s. 3d., Dorman Long to 26s. 6d., Guest Keen to 43s. 6d., and Stewarts & Lloyds to 53s. 3d. Ruston & Hornsby were 60s. 3d. and Thomas & Baldwins 10s. 10½d. United Steel at 25s. 1½d. were favoured on the possibility that a debenture conversion operation may be forthcoming. In the coal section, Powell Duffryn moved up to 22s. 10½d., Bolsover to 52s. 3d., and elsewhere Staveley were good at 45s.

British Drug Houses showed activity up to the higher level of 67s. 3d. Cellon 5s. shares were 30s., and British Match 46s. 9d., while Sangers rose to 32s. 9d. Boots Drug kept firm at 60s., with Timothy Whites 47s. 6d., and Beechams deferred 24s. 4½d. Erinoid 5s. shares changed hands around 13s. 6d. Fisons participated in the upward movement, changing hands up to 61s. Monsanto Chemicals 5½ per cent. preference marked 23s. 6d. and Greeff-Chemicals 5s. ordinary 11s. Oils were slightly irregular, Anglo-Iranian easing to 101s. 3d. on the latest Persian news.

British Chemical Prices

Market Reports

ACTIVITY has been sustained in most sections of the London chemical market and the undertone remains very strong. Home trade inquiries for new business have followed a steady course, while the flow of orders for overseas destinations continues to be on a substantial scale. Deliveries from producers' works are coming forward steadily and the supply position generally is, if anything, showing signs of improvement. Among the soda products there is a good demand for chlorate of soda, caustic soda, and yellow prussiate of soda, while in the potash products section available supplies of caustic potash and bichromate of potash are quickly taken up. Pressure for supplies continues to be felt for the lead oxides and also for tartaric and citric acids. Pitch is the main feature of the coal-tar products market and the demand for both home trade and export is persistent. In other sections of the market conditions are steady, with spot transactions difficult to negotiate.

MANCHESTER.—Conditions on the Manchester chemical market during the past week from the point of view of fresh inquiry have continued active, and plenty of buying interest has been in evidence among both home industrial users and shippers. New bookings in the heavies have included pretty well the full range of the soda compounds, bleaching powder, sulphate of copper, and the mineral acids, while the lighter classes are also meeting with a steady demand. Dyestuffs and textile chemicals generally are finding a ready outlet. In the tar products market, pitch, crude tar, creosote oil, carbolic, and most of the light distillates are the subject of steady inquiry.

GLASGOW.—All grades of light and heavy chemicals showed activity during the past week. There was a normal demand in the home trade for all standard heavy chemicals, with prices still tending to rise. The export market is still showing great activity, with inquiries for all classes of chemicals, many of which are still in short supply. Continued difficulty in regard to shipping space prevents the fulfilment of orders which have been received.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each. Numbers given under "Applications for Patents" are for reference in all correspondence up to acceptance of the complete specification.

Applications for Patents

Bactericides.—A/S Nitro Atomizer. 11634.

Metal-pickling apparatus.—Almarco, Ltd., and K. R. G. Fish. 11855.

Hydrocarbon distillates.—C. Arnold (Standard Oil Development Co.). 12081.

Alkylation processes.—J. C. Arnold (Standard Oil Development Co.). 11703.

Hydrogen production.—J. C. Arnold (Standard Oil Development Co.). 12082.

Luminescent materials.—British Thomson-Houston Co., Ltd. (General Electric Co.). 11871.

Benzene hexachloride.—L. J. Burrage, J. C. Smart and I.C.I., Ltd. 11823.

Polyoxyalkylene diols.—Carbide & Carbon Chemicals Corporation. 11604.

Metal powders.—Communication Engineering Pty., Ltd. 12136.

Fluid-flow control, etc.—Dallow, Lambert & Co., Ltd., and F. Bingley. 11861.

Vitamins.—Distillation Products, Inc. 11940, 11941.

Interpolymers.—E.I. Du Pont de Nemours & Co. 11831.

Alkali metal.—E.I. Du Pont de Nemours & Co. 11827.

Fluorescent materials.—E.I. Du Pont de Nemours & Co. 11993.

Water softeners.—J. E. Edwards, and I.C.I., Ltd. 11992.

Insecticides.—H. F. Gatward. 11714.

Dyestuffs.—J. R. Geigy, A.-G. 11664.

Ethers.—General Aniline & Film Corporation. 12075.

Thermoplastics.—R. C. de Holzer. 12176.

Electrolytic processes.—W. N. Howell, H. Hill and I.C.I., Ltd. 11824, 11825.

Polyamides.—Imperial Chemical Industries, Ltd. 11828.

Elastomers.—Imperial Chemical Industries, Ltd. 11829.

Heterocyclic compounds.—D. G. Jones, and I.C.I., Ltd. 11820.

Soap.—Lever Bros. & Unilever, Ltd. 12073.

Magnesium alloys.—Magnesium Elektron, Ltd., and J. B. Wilson. 11843.

Magnesium alloys.—Magnesium Elektron, Ltd., J. B. Wilson, A. C. Jessup, and P. A. Fisher. 11844.

Nylon.—L. C. Malkin. 12121.

Glycerides.—Nordiske Fabriker De No Fa A/S, and C. F. Holmboe. 11980, 11981, 11982.

Treatment of castor oil.—A. J. Paluszek, and J. H. Hayes. 11742.

Crystal filters.—Patelhold Patentverwertungs & Elektro-Holding, A.-G. 12070.

Tungsten filaments.—Philips Lamps, Ltd 11779.

Chemical X-ray analysis.—Pittsburgh Testing Laboratory. 11633.

Antibacterial substances.—Roche Products, Ltd., A. Cohen, and H. Rinderknecht. 11753.

Lubricating substances. Rotax, Ltd., and J. Levy. 11728.

Dyestuffs.—Sandoz, Ltd. 11662.

Synthetic coating materials.—Schori Metallising Process, Ltd., and C. F. Lumb. 12087.

Liquid extraction machines.—J. A. de Smet. 11610.

Pyridine.—A. H. Stevens (Phillips Petroleum Co.). 11989.

Silver compounds.—A. H. Stevens (Sunshine Mining Co.). 11990.

Thermoplastic coating materials.—Sylvania Industrial Corporation. 11766.

Slag removal.—M. Tama, and M. Tama, 11641, 11642.

Electrodeposition of tin.—W. W. Triggs (Carnegie-Illinois Steel Corporation). 11739.

Distilling apparatus.—Union Chimique Belge, S.A. 12107.

Welding rods.—Welding Supplies, Ltd. (Elektriska Soltsnings A/B) 12103.

Hard pitch, etc.—T. O. Wilton, D. R. Kernon, and Chemical Engineering and Wilton's Patent Furnace Co., Ltd. 11961.

Copolymers. — Wingfoot Corporation. 11810.

Complete Specifications Open to Public Inspection

Refining of liquids.—Brassert & Co., Ltd. May 28, 1939. 6218/46.

Cellular phenolic resin.—British Thomson-Houston Co., Ltd. Oct. 20, 1944. 26872/45.

Water-disinfecting compound and method of treating water.—Burnham Soluble Iodine Co. October 16, 1944. 28161/45.

Basic refractory products, in particular basic refractory linings for furnaces and parts of furnaces.—Commentry Fourchambault et Decazeville. October 31, 1941. 5999/46. February 19, 1943. 6314/46.

Vacuum dehydration.—Distillation Products, Inc. October 18, 1944. 26263/45.

Filaments comprising a hydrolised interpolymer of ethylene and vinyl organic ester.—E.I. Du Pont de Nemours & Co. October 18, 1944. 27137/45.

Drawn fibres of hydrolised ethylene vinyl organic ester interpolymers.—E.I. Du Pont de Nemours & Co. October 18, 1944. 27138/45.

Chain-substituted cyanine dyes containing a carbonyl and thiocarbonyl group.—General Aniline & Film Corporation. October 17, 1944. 26953/45.

Stabilised silver halide emulsions.—General Aniline & Film Corporation. October 17, 1944. 27399/45.

Measuring the humidity of gases.—H. Greinacher. October 21, 1944. 27229/45.

Redistilling rectifying columns and methods of rectification.—Gulf Research & Development Co. October 21, 1944. 19632/45.

Preparation of fluorohydrocarbons.—Imperial Chemical Industries, Ltd. October 21, 1945. 27704/45.

Quinolines.—E. Lilly & Co. October 19, 1944. 24695/45.

Chemical manufacture.—Mathieson Alkali Works. October 21, 1944. 20943/45.

Chemical compounds.—Merck & Co., Inc. October 21, 1944. 26485/45. 26486/45.

Aromatic amine-aldehyde resinous products.—Norton Grinding Wheel Co., Ltd. July 23, 1942. 11891/43. 11893/43. 11895/43.

Carbon black.—Phillips Petroleum Co. February 16, 1942. 20281/45.

All-purpose detergent.—Procter & Gamble Co. October 16, 1944. 19529/45.

Viscose.—Rayonier Inc. October 18, 1944. 27057/45.

Preparation of brilliant colours of the anthraquinone series.—Sandoz, Ltd. October 19, 1944. 26970/45.

Polymers of α, β-unsaturated aldehydes and the process for their production.—Shell Development Co. October 23, 1944. 19554/45.

Granulated synthetic resin compositions.—L. Smidth. June 22, 1944. 15685/45.

Granulated fertilisers.—S.A. Des Manufactures des Glaces et Produits Chimiques de Saint Gobain, Chauny and Cirey. October 18, 1944. 27401/45.

p-Amino-phenol.—Soc. des Usines Chimiques Rhône-Poulenc. October 17, 1944. 26048/45.

Liquid condensable organic compounds starting from vegetable materials.—Soc. Pyrénéenne de Carburants et Solvants October 19, 1944. 27369/45. 27371/45.

Conversion of celluloso-ligneous materials into liquid condensable organic products of ketonic character.—Soc. Pyrénéenne de Carburants et Solvants. Oct. 19, 1944. 27370/45

Pre-oxidation of stainless steel.—Sylvania Electric Products, Inc. October 18, 1944. 3221/45.

Unsymmetrical cyclical acetonalkamines in labile form, and to the production of eucatropine hydrochloride therefrom.—W. R. Warner & Co., Inc. October 19, 1944. 24932/45.

Foam-generating compositions.—Wormald Bros. Proprietary, Ltd. October 20, 1944. 24296/45.

Complete Specifications Accepted

Process for the preparation of 2,2,3 trihalogen-alkanal-1 compounds.—J. C. Arnold (Pennsylvania Salt Manufacturing Co.). June 3, 1944. (Addition to 576,435) 576,805.

Resinous compositions.—Bakelite, Ltd. March 4, 1943. 576,745.

Manufacture of cellulose.—C. G. Bonard. March 16, 1944. 576,785.

Adsorption apparatus.—Commonwealth Engineering Co. August 27, 1942. 576,727.

Filtering apparatus.—Curran Bros., Ltd., and W. E. Curran. August 31, 1944. 576,707.

Production of the formal and hemiformal of ethylene cyanohydrin.—E.I. Du Pont de Nemours and Co. May 3, 1943. 576,800.

Production of new organic silicon compounds.—P. J. Garner, and I.C.I., Ltd. June 6, 1940. 576,716.

Dyeing of synthetic polymers.—W. E. F. Gates, and I.C.I., Ltd. (Cognate Applications 6443/44, 11050/44 and 11051/44.) April 6, 1944. 576,685.

Process for the manufacture of a derivative of α, γ-dihydroxy β, β-dimethyl-butyric acid.—F. Hoffmann-La Roche & Co., A.-G. (Cognate Applications 8045/44 and 8046/44.) September 6, 1943. 576,758.

Production of sulphamic acid.—Imperial Chemical Industries, Ltd. (E.I. Du Pont de Nemours & Co.). January 14, 1944. 576,739.

Manufacture of lubricating compositions and additives to be included therein.—N. V. de Bataafsche Petroleum Mij., J. J. Frewing, C. D. Graaff, and R. S. Airs. January 24, 1944. 576,740.

Preparation of chlorinated rubber and other chlorinated rubber-like materials and chlorinated rubber hydrochloride.—E. P. Newton (Hercules Powder Co.). February 9, 1944. 576,744.

Electro-chemical surface cleaning of metal articles.—Rylands Bros., Ltd., R. S. Brown, and A. Brierley. April 1, 1944. 576,698.

Sealing the passage of tubes through the walls of boiler flues, furnaces, combustion chambers and the like.— J. R. Sanders. February 29, 1944. 576,782.

Rotary pumps, rotary compressors or the like.—A. K. G. B. Tornborg. May 13, 1943. 576,795.

Welding of aluminium or aluminium alloys. Wrought Light Alloys Development Association, and E. G. West. June 10, 1944. 576,769.

Method of and means for separating slag from furnace gases.—Brown, Boveri & Cie., A.G. July 14, 1943. 576,932.

Piperidine derivatives.—G. M. Badger, H. C. Carrington, J. A. Hendry, and I.C.I., Ltd. May 5, 1944. 576,962.

Resinous polymerisation products.—British Thomson-Houston Co., Ltd. June 23, 1942. 576,944.

Electro-deposition of metal on non-conductive material.—Callender-Suchy Developments, Ltd., and C. T. Suchy. May 18, 1944. 576,875.

Processes for making dicarbonylic compounds.—Carbide & Carbon Chemicals Corporation. July 7, 1943. (Addition to 557,347) 576,877.

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