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### National Aspects of the Fine Chemical Industry.

**I**N a speech rarely equalled for its quality and delicately woven argument, Lord Moulton recently put into clear perspective the case for fostering the fine chemical industry in this country. All who during the war-years shared with him the terror of what the chemical industry enabled our enemies to do will accept his view as to the imperative need of treating this as a key industry and stabilising it on a thoroughly satisfactory and efficient foundation. However vaguely we may visualise the boundaries of key industries in general, no one has any doubt as to whether the fine chemical industry comes within them.

One aspect of the importance of this industry may be compared with that of the shipping industry, for just as our maritime supremacy depends upon the strength of our Navy, and hence upon the ability to man it with a race of seafaring men directed by able officers, so also does our future position depend upon our chemical ability, and hence upon the employment of skilled workers directed by trained chemists engaged in a successful organic chemical industry. The necessary conditions for training our seamen are inherited as a birthright, while those for training our chemical workers have to be created. Such workers as those employed in the manufacture of organic chemicals and optical lenses must be trained from early life, and they become proficient only after many years.

It is reported from many quarters that German

interests are making a determined effort to destroy those fine chemical manufactures already set up in this country by selling the particular commodities concerned at prices well below the cost of production here, whilst charging exorbitant prices for those chemicals of which they retain the monopoly. Such efforts should be resisted at all costs. The object is to relegate to the scrap-heap the costly plant set up in this country, and to terrorise those who might otherwise be willing to risk capital in developments of a like nature. As a nation we must in the long run pay more if we succumb to this attack and again allow the German monopoly to be established. Not only will a great loss of capital be incurred, but we shall also ultimately pay very dearly for the products now being sold at such low prices, because in a few years' time the far-reaching influence of the war debt will bring about a rise of production costs in Germany. It is also to be presumed that the exchange will become in a measure equalised.

Research workers in this country naturally feel concerned lest the machinery which the Government will make use of to effect the desired protection may adversely influence their work by limiting the supply, or increasing the cost, of research chemicals. It is to be hoped that the terms of the Bill will be such as can be interpreted to give satisfactory safeguards in both these respects. It cannot be supposed that British chemical manufacturers will welcome any measure which seriously hinders research, of which they have recently learned to appreciate the value so well. The patriotic manner in which the manufacturers of fine chemicals responded to the call made upon them at the outbreak of hostilities, and the unselfish service which many of them gave throughout the war, may be taken, we hope, as indicating their attitude in this matter. However, on account of the cost of labour, it is self-evident that the prices of chemicals made in this country must for a time be somewhat higher than those ruling in Germany. German workers to-day are paid the equivalent of 5*d.* an hour, while similar workers in England receive 2*s.* an hour. It is therefore clearly impossible immediately to equalise the prices of chemicals, even should we completely counteract the German effort to destroy the industry.

It is interesting to follow the course which the prices of many of these organic chemicals have taken since 1914. As soon as the supply of German products in the hands of dealers was insufficient to meet the demand, prices rose pre-

posterously high; but as the manufactures became established here they were brought back to a level very near to, though a little higher than, the pre-war figure. This adjustment took place before the resumption of German competition. It may be assumed that the same factors will operate to reduce the cost of any new manufactures which are undertaken, if only we can patiently put up with the difficulties during the present years of transition.

Owing to the rate of exchange, it is possible for the moment to purchase research chemicals from Germany at very low prices. It is timely to remind those who have been ready at once to resume purchasing organic chemicals from Germany of the already successful efforts to supply research chemicals which have been made in this country at the instigation of the Association of British Chemical Manufacturers. Although it has been clearly impossible since the war to prepare a complete collection of the innumerable organic compounds required for research, like that previously held in Germany, a very considerable number of such compounds of British manufacture are now offered through trade channels.

British manufacturers should be encouraged to go on adding to their collection, temporarily supplementing it as may be necessary by purchasing abroad. Research chemicals being required in very small amounts, it cannot pay the manufacturers to continue their efforts unless they receive a large body of support.

The development of British chemistry is aided by any steps which result in giving employment and openings for more chemists. The extension of our chemical industries, especially in the domain of organic chemistry, helps not only by attracting to the profession men of ability who in the choice of a career must be guided by opportunities for useful service with good remuneration, but it helps also by supplying a good training ground for the graduated student who otherwise would not find the right opportunity for specialisation.

Chemists find employment in the organic chemical industry in great numbers because of the variety of ways in which they are needed. Complex reactions of the type involved must be controlled in every stage of manufacture by a chemist. Even old-established processes call for continued investigations both for the purpose of improving them and for grappling with new difficulties which are continually arising. There are

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also in every large works research, analytical, and process-control laboratories, in each of which young men are engaged under competent direction. These laboratories constitute a very valuable training ground for chemists, who in reality always acquire an important proportion of their chemical knowledge during the years following the completion of their university curricula. With the expansion of the fine chemical industry there would be fewer of those cases where young men of great talent have given up their career in chemistry because the opportunities were so few and the prospects so poor.

The general effect of expanding chemical industry will be to enhance the status of chemical science in this country. The academic life of a people is profoundly affected by the national industries, and any measures designed to foster and preserve those industries which call for the greatest exercise of scientific knowledge and skill are, therefore, closely concerned also with purely scientific studies. It is largely on this account that we give our support to action which will help to safeguard the fine chemical industry in this country.

### A Physical Theory of the Universe.

*Space, Time, and Gravitation: An Outline of the General Relativity Theory.* By Prof. A. S. Eddington. Pp. vii + 218. (Cambridge: At the University Press, 1920.) Price 15s. net.

"THE mind is not content to leave scientific truth in a dry husk of mathematical symbols, and demands that it shall be alloyed with familiar images. The mathematician, who handles  $x$  so lightly, may fairly be asked to state, not indeed the inscrutable meaning of  $x$  in Nature, but the meaning which  $x$  conveys to *him*."

This is a quotation from the preface to the work now before us, and it aptly summarises the author's task. It is a commonplace to say that no modern development of scientific thought has evoked such a widespread attempt on the part of the layman to understand its import. It would be equally true to say that no other development ever contained within itself such formidable barriers to comprehension. For the theory of relativity, in its general form, deals with conceptions which have had no place in the usual mode of thought, and a large part of our mental scaffolding must be pulled down before we are in a condition to attempt to form a picture of the external world which shall satisfy us as our older pictures have done. Other treatises on the subject now exist, but none which proposes, without the