

THURSDAY, DECEMBER 30, 1915.

SCIENTIFIC RESEARCH AND CHEMICAL INDUSTRY.

THE future prospects of the British dye industry, and the organisation of it and other scientific industries, have been the subjects of much attention lately. The developments taking place in Japan, Russia, Italy, and America in regard to the manufacture of synthetic dyes were discussed by Dr. F. M. Perkin in a lecture recently delivered before the Society of Dyers and Colourists at Bradford. The latest American enterprises in this industry were described in NATURE of December 16, p. 429, and the conclusion was drawn that, in a few years, America will be very largely self-contained in the matter of dye wares. This condition may, with reasonable certainty, be postulated of the other industrialised countries, including France, and, one may hope, the British Empire. If this anticipation be realised, it will mean that the synthetic dye industry, with all the allied trades in fine chemicals, will have entered on a new phase of their development. Before the war these industries were very largely a German monopoly. After the war they will be comparable with the brewing and distilling trades in that the wants of each industrialised nation will be supplied almost entirely by manufacturers of the same nationality. Only a few dyes or fine chemicals having specially desirable properties will find their way across the frontiers, just as is now the case with alcoholic beverages of international reputation.

So far as the existing dyes and fine chemicals are concerned, there can be little doubt that in the course of twelve months or so processes will have been worked out for the manufacture of these products on an industrial scale. At first it will certainly not be found possible to produce these materials so cheaply as was formerly done by our German rivals. Both the capitalists and the consumers will need at first to exercise considerable patience and forbearance. Later, as technical experience increases, the cost of production will certainly diminish. But even if all the synthetic products on the market before the war are captured in this way and manufactured at a reasonable price, this development, although representing a considerable advance, will not suffice to ensure the continued stability of the chemical industries. There are no ideal dyes, drugs, or other fine chemicals; all are capable

of improvement, and, in spite of the distractions of the war, many German chemists are engaged in the amelioration of existing chemical products. Only quite recently the report has filtered through of a further considerable advance in the production of synthetic indiarubber. These developments call for corresponding efforts on our part, and the demand arises for more and better-trained chemists.

The view has been put forward in certain quarters that now is the day of the chemical engineer. It is undoubtedly true that a chemist with some mechanical aptitude will find a useful outlet for this bent in the chemical factory, but unless he exercises the trained chemical mind, and the synthetic ability to make chemical discoveries, he will never have the problems on which to utilise his engineering talents. Perkin's mauve, Meldola's blue, Knorr's antipyrine, Ehrlich's salvarsan, Baekeland's baekelite, and many other valuable discoveries were made by chemists working at these problems from a purely chemical point of view, and although some of these eminent investigators may have had more or less mechanical aptitude enabling them to put their discoveries into operation on a more extended scale than in the laboratory, yet the indisputable fact remains that they made these discoveries first and foremost because they were trained chemists with the chemical insight into the molecular constitution of the materials they studied. As a connecting link between chemist and engineer, the chemical engineer may serve a useful purpose, but he can never become an efficient substitute for the chemist. The latter alone with his own hands, and usually with cheap improvised apparatus, makes the synthetical discoveries which then become the factory problems for the engineer.

As regards the organisation of chemical workers for industrial research, it must not be assumed that conditions applicable to Germany will be readily adopted in the United Kingdom. Due regard must be made for the highly developed individualism of the British character, with its sporting instincts, its love of personal liberty, and its disinclination to sink natural predilections and to take the point of view of the State. It is useless to deplore these apparent shortcomings of the national temperament; indeed, in certain contingencies they are to be regarded rather as virtues. This preference to fight for one's own hand has probably, in many a recent desperate battle, kept intact the thin extended khaki line against overwhelming hordes of more amenable

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individuals who have acquired the pack habit. Yet while we cannot but admire the instinct for individual action thus displayed, it must be confessed that success in modern conflicts—military or industrial—is mostly commanded by disciplined forces organised for co-operative effort against the common enemy.

At a meeting of the London Section of the Society of Chemical Industry held during November, a long discussion took place on Dr. M. O. Forster's suggestion that a chemical intelligence department should be instituted by the Government as a branch of the Board of Trade. Although the majority of speakers agreed that an organisation for chemical industry was necessary, there appeared to be a disinclination to entrust the Government with control of this department. A scheme for a co-operative organisation established by the chemical industry itself had already been advocated in September by the *Chemical Trade Journal*. This development, although a consummation devoutly to be wished, scarcely seems practicable in view of the separatist tendencies which still manifest themselves from time to time, both in the chemical profession and among chemical industrialists.

After the war much of the plant newly erected for the manufacture of high explosives will be available for the production of synthetic dyes and other fine chemicals. The relationship between these factories and the existing chemical works will need to be dealt with sympathetically and impartially by a competent authority, otherwise much loss of capital and energy will ensue as the result of competition between organisations working on similar lines. The elimination of this internal friction in our chemical industries would be a useful function of the suggested chemical intelligence department.

Many reasons have been advanced to explain our inability to develop the industries based on chemical synthesis. Taken separately, these factors are inadequate to account for the failure. Collectively they are effects of a fundamental cause discovered in early-Victorian times by Justus von Liebig, who, after a visit to these islands, declared roundly that "England ist nicht das Land des Wissenschaftes." One may well ask what chance have we of reforming in this respect? A gleam of hope arises from the following consideration. Formerly the advantages of a German university training were confined to 1851 Exhibitioners and to a few of the more well-to-do among us. To-day considerably more than a million of our fellow

countrymen, drawn at an impressionable age from every station in life, are pursuing their scientific studies at an open-air German university under conditions which compel their undivided attention. Many of them realise very forcibly that the advantages possessed by their enemy instructors are due entirely to scientific organisation. When our soldier-students return to civil life will they insist upon scientific control of all national affairs? In that possibility lies our strong hope.

THE MOLECULAR VOLUMES OF LIQUIDS.

The Molecular Volumes of Liquid Chemical Compounds from the point of view of Kopp. By G. Le Bas. Pp. xii+275. (London: Longmans, Green and Co., 1915.) Price 7s. 6d. net.

TO anyone interested in the progress and development of science in this country, and in the attitude of the general community towards it, it is a significant and welcome sign that English publishers should now be found willing to undertake the issue of highly specialised works of the kind under review. For nothing would seem more clearly to indicate the spirit which is gradually coming over the community than the fact that there should be a demand, even if limited, for such a book. No doubt this demand has been stimulated by the influence of the more active and progressive teachers in our universities and leading schools of science. This series of monographs on biochemistry, physics, and inorganic and physical chemistry, comprising up to now some three dozen volumes, each the work of an eminent specialist, marks a new departure in the scientific literature of this country. The books are not text-books in the ordinary sense; that is, they are not intended to be used in or to accompany class-teaching. They are addressed mainly to those who have already passed through lecture-room courses, and who before embarking upon the work of investigation in some particular branch of experimental inquiry are desirous of making themselves acquainted with the present state of knowledge in that special department. Their publication at the present time is most opportune.

The titles of some of the volumes may not, at first sight, suggest that they have any practical bearing upon the problems with which we are more immediately confronted. But to disparage them on this account is to take a very restricted view of their utility. As they deal, for the most part, with what may be called frontier—or pioneering—work, they are of the very greatest use to those who are bent upon exploratory