Chemical Industry and Technical Institutions.

MR. W. J. U. WOOLCOCK, general manager of the Association of British Chemical Manufacturers, delivered a striking address to the annual conference of the Association of Teachers in Technical Institutions which was held at Plymouth on June 4-7. Dealing with technical education and industry, he illustrated his theme by reference to chemistry, pure and applied. With this in mind, he traced the growth of the British chemical industry, which is now, he said, among the six greatest industries of the country; £200,000,000 capital is invested in it; it employs a quarter of a million workers and is exceedingly well organised. Not very long ago its range was small and, in Great Britain, relatively unimportant: to-day it provides the largest field for the scientific chemist. It has made greater strides in its post-War development than any other British industry, and is of such a wide character that it is difficult to set limits to its boundaries.

Three new points are, however, to be noted. While at one time chemical industry was practically the only outlet for the trained chemist who desired to apply his knowledge to industry, there is now no industry which cannot be benefited by the application of scientific knowledge to its control and development. There is, therefore, an almost unlimited field for the technically trained man or woman. Again, the post-War developments have been specially remarkable. Actually, of course, we have always had some sort of chemical industry in Britain, but what is called chemical industry is really an aggregation of a number of industries in many of which we have held our own for more than half a century. Particularly is this true of what are known as the heavy chemical industries. But since the War we have developed and maintained the fine chemical industries such as dyestuffs (the Dyestuffs Act helped considerably), research, medicinal, and photographic chemicals. We are therefore able to speak now with America, Germany, France, or Switzerland in brotherly terms, not in the terms of the poor relation.

There remains a third point, which refers to the boundaries formerly set between scientific and 'non-scientific' industries. Already it has been pointed out that there is no industry which cannot be benefited by scientific methods; it is also true that there is a number of industries doomed to extinction if such methods be neglected. "Thus," said Mr. Woolcock, "I say not only to the chemists here, but to the physicists, electricians, and especially to the biologists, that whatever industry you enter, or whatever part you have to play in teaching those who may become industrialists, yours is a great vocation. I use no words of exaggeration when I say that the future of this country can be very largely influenced by what you can do." He was not concerned at the moment, he said, with the philosophical implications of technical education. He wanted to look at it from the viewpoint of what sort of men and women it produces—a test upon which technical teachers should be prepared to be judged. After all, the business man has to fit the product of teaching into the realities of his business. He can therefore recognise its good results in his own practical affairs, and he is bound to notice what appear to him to be its deficiencies.

On the whole, the present system gives satisfactory results, but there remain certain deficiencies to be made good. Mr. Woolcock would suggest that there is not available a sufficient number of trained scientific persons who have been taught from the point of view of economy. It is possible to teach the principles of chemistry and engineering in such a way as to inculcate throughout those conceptions of efficiency with regard to expenditure on material, labour, wear and tear of machinery and plant, heat, light, power, and so forth, which are essential to industry. It may be replied that this is already being done in some measure; but it must become far more general and must start quite early in the training of young scientific workers. An important aim, too, of technical education is the acquirement of ability in experiment, and by this is meant not only manipulative skill, but also imaginative conception. The teaching of manipulative skill is bound to vary in quality in accordance with the standard of the teacher. That cannot be avoided, but it is still possible that manipulative skill and manipulative conception can be developed in all their bearings from the point of view of their quantitative efficiency. From this it seems to follow that there is need to widen the scope of technical education. It might usefully include administration, costing, and production.

In his sketch of the development of the chemical industry, Mr. Woolcock said that, following the addition of fine to the heavy chemical industries, another development is taking place right under our eyes. It is a development along lines of production in enormous quantities of commonplace articles. "Undoubtedly," he said, "the industry has provided a bigger outlet than any other in the country for your students."

The New Experimental Station of the Safety-in-Mines Research Board.

THE official opening on June 14 of the new Experimental Station of the Safety-in-Mines Research Board at Harpur Hill, near Buxton, is an event of much importance in the mining world. It was fitting that the ceremony should be performed by Lord Chelmsford, chairman of the Miners' Welfare Fund Committee, and should be welcomed in no uncertain tones by Mr. Herbert Smith, president of the Miners' Federation.

Lord Chelmsford, in his speech, made it clear that the assistance of the Welfare Fund had only been obtained on two conditions: (1) that the nature and locality of the Station should be approved by both the owners and miners, and (2) that the experimental plant and its scientific equipment should be the best that could be designed for the purpose. When the Committee was unanimous on these two essentials it had no difficulty in allocating a large capital sum for acquiring and equipping the site at Harpur Hill for the experiments which could only be carried out on a large scale, and for erecting at Sheffield buildings for laboratory researches especially connected with the properties of coal and with improvements in the miners' safety lamp. Besides this capital expenditure, an endowment fund of £250,000 had been invested to provide an annual income for the purposes of research.

The Committee, Lord Chelmsford added, did not suppose that immediate practical results would follow from a few scientific experiments; it is realised that the problem of securing safety in mines becomes more and more complex as the workings are extended, and it is only by the most patient research—not by one man, but by a trained staff working under skilled

direction—that progress can be made. Fortunately, the country possesses in the Research Board a body of experts, administrative and scientific, who can advise on the work, and in Dr. Wheeler it has a director of research who commands the full confidence of the Board. What is eminently desirable is to maintain the closest touch between the mining industry and the Research Board. The public are deeply interested in the problems the Board has to solve, and it should not be beyond the wit of man to keep the public informed of the methods used and the results obtained in language which can be followed by ordinary folk unversed in scientific formulæ.

After the opening speech, the chairman, Col. Lane-Fox, the Secretary for Mines, called on Mr. Eustace Mitton on behalf of the Mining Association (in the absence through illness of the president, Mr. Evan Williams), and on Mr. Herbert Smith, president of the Miners' Federation. The latter at once struck a note to which the large audience were responsive. "There are two things," he said, "in regard to which coal-owners and miners are always friends—first, how to save life and limb, and secondly, how to rescue when life and limb are at stake." On that platform they stood as one. He warmly commended the Welfare Fund, and the work that had been done under the chairman's guidance. He admitted the difficulty of persuading miners that there is danger in coal-dust, and he recognised the importance of the artificial mine that demonstrated the destructive violence of a pure coal-dust explosion, but stated that the plant that appealed to him most as a Yorkshire miner was the building where artificial gob fires could be initiated and studied throughout their various courses.

On the new experimental station the most important sections of the research equipment are the two steel galleries which have been constructed for testing the explosibility of coal dusts under various conditions. One of these, in which the greater part of the systematic work will be carried out, is 4 feet in diameter and 1000 feet long. The other, which will be used mainly for demonstration explosions, is $7\frac{1}{2}$ feet in diameter and 390 feet long. They are connected to fans arranged for creating a current of air in them in either direction.

The 4-foot gallery is equipped with instrument cabins every 100 feet, containing apparatus for measuring the pressures produced during the explosions and the speeds of the flames. These instruments are controlled from a distance at the observation station. Two special sections have been included in this gallery for investigating the effect of openings in the gallery (corresponding to the branches off an underground road) on the development of a coal-dust explosion.

Research on Firedamp Explosions.—The $7\frac{1}{2}$-foot gallery is also used for the study of firedamp explosions. One of the principal series of experiments now in progress is to determine the distance to which the flame of an explosion can be projected along a roadway beyond the area originally occupied by the explosive mixture.

There is another gallery, one foot in diameter and 300 feet long, in use for studying the effect of restrictions in the path of the flame on its speed.

Research on Coal-mining Explosives.—The buildings for this work include (*a*) a research laboratory and gun-room in which photographic methods are used to investigate the flame and the pressure waves sent out by an explosive when it is fired, and (*b*) an explosion gallery and observation station where the igniting power of explosives under different conditions of detonation is tested directly by firing them into explosive mixtures of firedamp and air.

Research on Gob Fires.—Some coalfields suffer from fires which break out in the gob or goaf, the part of the mine where the coal has been worked. The building in which the study of gob fires is being made consists of a central chamber, 30 feet square and 8 feet high, simulating a goaf, with an air passage, approximately 6 feet wide by 7 feet high, circumscribing it. The main object of the research in progress is to determine the limiting conditions necessary for the production and ignition of explosive gas mixtures from a fire behind a stopping, and to study methods of sealing off a fire so as to avoid these conditions. Records of the temperature, and samples of the atmosphere at different points within the sealed-off area, can be taken periodically.

University and Educational Intelligence.

CAMBRIDGE.—Mr. Roger Fry, Sir John Marshall, and Prof. A. V. Hill have been elected honorary fellows of King's College. The Council has proposed to the University that the degree of LL.D., *honoris causa*, be conferred upon the Duke of Northumberland, Sir Archibald Denny, Sir Eustace Tennyson-D'Eyncourt, and Sir Charles Oman in connexion with meetings to be held at Cambridge this summer of the Institution of Naval Architects and of the Royal Archæological Institute. It is also proposed that the degree of M.A., *honoris causa*, be conferred upon Lieut.-Col. J. E. Craster, late R.E. Sir Humphry Rolleston has been appointed to represent the University at the coming Imperial Social Hygiene Congress.

Mr. A. S. Besicovitch, of the University of Leningrad, has been appointed lecturer in mathematics. Mr. H. W. Florey, Gonville and Caius College, has been appointed to the Huddersfield lecturership in special pathology. Dr. C. M. Yonge has been nominated to use the University Table at the zoological station at Naples for six months.

The annual report of the Solar Physics Observatory gives an account of the preparations and programme of Prof. Newall's expedition to Aal in Norway for the total eclipse of June 29.

Mr. R. V. Sayce has been appointed lecturer in material culture and physical anthropology. Dr. J. Chadwick, Gonville and Caius College, has been re-appointed lecturer in physics and assistant director of radio-active research.

F. W. Shotton, Sidney Sussex College, has been elected to the Harkness Scholarship in geology. E. J. H. Corner, Sidney Sussex College, and A. L. Bennett, Christ's College, have been awarded the Frank Smart prizes in botany and zoology respectively. The Tyson medal, in astronomy, has been awarded to C. S. M'Leod, Emmanuel College, and the Mayhew Prize in applied mathematics to J. Hargreaves, Clare College. The Rex Moir Prize in engineering and the Ricardo Prize in thermodynamics have been awarded to J. N. Goodier, Downing College. The John Bernard Seely prize in aeronautics has been awarded to C. E. Maitland, Peterhouse.

A grant has been made by the Balfour Managers to E. B. Worthington, Gonville and Caius College, for researches on the plankton of the Victoria Nyanza.

EDINBURGH.—At the meeting of the University Court on Monday, June 13, it was intimated that the Highland and Agricultural Society had resolved to make a grant of £1000 towards the endowment of the Department of Research in Animal Breeding.

The Court decided to make an annual contribution of £50 to the newly established British Institute in Paris.