According to the authors "the thermal decomposition of petroleum into aromatic compounds occurs at temperatures considerably in excess of those needed for simple cracking, and in consequence much more serious losses occur in the shape of carbon and fixed gases. Paraffin hydrocarbons at these temperatures are almost completely decomposed. The desired products are not the primary results of cracking; they are obtained from them by further decompositions and synthesis. Accompanying them are other characteristic bodies, usually classed under the heading of unsaturated hydrocarbons, but which are far more reactive than the simple olefines. . . . Summing up, therefore, the effects of temperature on petroleum may be said to be: (1) temperatures up to 500°–600° yield in the main mixtures of olefines and paraffins; (2) temperatures about 700° yield a mixture of olefines, diolefines (*e.g.* butadiene), and aromatic hydrocarbons, with little paraffins; (3) temperatures about 1000° yield mainly permanent gases and a tar similar to coal-tar, in that they both contain aromatic hydrocarbons."

The effect of pressure on cracking appears in general terms to be that increased pressure favours synthesis, whilst diminished pressure promotes dissociation.

A very interesting development in the thermal decomposition of hydrocarbons is the effect of catalysts. Moissan first observed the production of liquid hydrocarbons (among them being benzene) by the contact of acetylene with metals, and in the well-known method of reduction of Sabatier and Senderens finely divided nickel, cobalt, iron, and other metals have been employed with and without hydrogen with very noteworthy results. Acetylene on reduction in presence of nickel yields both paraffins and cycloparaffins in proportion resembling Baku, Galician, and Pennsylvanian petroleum. Coke also behaves as a catalyst.

At the end of this very informing paper the authors give a summary of the mechanism of pyrogenesis, which does not admit of abbreviation, and is too long for reproduction. Those who are interested in the subject will feel that the authors have accomplished an important service to the coal-tar and petroleum industry in presenting to the public at such an opportune moment this valuable and exhaustive memoir.

J. B. C.

METALLIC TUNGSTEN POWDER AND HIGH-SPEED STEEL.

ONE of the most successful of the manufactures which have been established in this country by reason of the war is that of metallic tungsten. This metal occurs naturally in the form of oxide, together with the oxides of iron, manganese, and calcium. Pure tungsten powder is obtained by first isolating the tungstic oxide and then reducing it, whilst ferro-tungsten is obtained by reducing the mixed oxides. For the production of the best high-speed steel metallic tungsten powder is necessary, because ferro-tungsten contains impurities which are eliminated only when the process of separating the tungstic oxide from the ore is employed. Before the war almost all the pure tungsten powder was supplied by Germany, whilst ferro-tungsten was manufactured in France and, on a small scale, in this country. On the declaration of war only a limited stock of tungsten existed in this country, whilst the necessity for a large output of high-speed steel was urgent. The way in which it was supplied is described in an article in the *Chemical Trade Journal* for December 9.

An inquiry instituted by the Government showed that a factory for the production of metallic tungsten powder was essential. The Committee of High-Speed Steel-Makers, which took the matter in hand, recommended the engagement of the services of Mr. J. L. F. Vogel, and a company (High-Speed Steel Alloys, Ltd.) was formed, in which thirty firms manufacturing high-speed steel became shareholders. A site chosen at Widnes was taken over in November, 1914, and building was sufficiently advanced in July, 1915, for the commencement of production. The factory, which occupies a site of about six acres, is divided into eight departments. The first department comprises a warehouse for the storage of the ore, grinding and mixing plant, and the magnetic separator. The second department contains furnaces for roasting the mixed ore with soda, whereby all the tungsten is converted into sodium tungstate. In the third department the furnace product is broken up and conveyed automatically into the next department, where it is extracted with boiling water. The solution of sodium tungstate passes to the fifth department, where it is treated with acid. The resulting yellow tungstic oxide is dried in the next department, and prepared for reduction. The seventh department contains the furnaces for heating the crucibles to reduce the tungsten. The metal is washed and dried in the last department. The product has contained on an average 98·5 per cent. pure tungsten, which is one per cent. better than the German product.

The Government took control of all wolfram ore in the British Empire on September 1, 1915, but the amount being insufficient to meet the full demand, the High-Speed Steel Alloys Co., to improve the output, has purchased mines in Burma, and has sent out Dr. W. R. Jones, formerly of the Indian Survey, to take charge of operations.

EDUCATIONAL CONFERENCES.

AT the opening meeting of the Conference of Educational Associations, the chairman, Sir Henry Miers, directed attention to the wide interest aroused of late in educational questions, and laid down three lines of general agreement: continued education beyond fourteen, an improvement in the position and prospects of teachers, and a reorganisation of the scholarship system. We need to promote in young people a desire for further education and the power to carry it on, and to provide facilities for the exercise of that power. Mr. A. L. Smith, the Master of Balliol, in his inaugural lecture, struck a similar note. That all recently published programmes of reform should be working in the same direction, that so many suggestive experiments in the psychology and practice of education should be in progress, and that so wide an interest should have been aroused among workers, employers, and business men he regarded as very hopeful signs. As head of a great Oxford college he welcomed the controversy between classics and science, and expressed the opinion that much of the old curriculum should be discarded, that no one could be considered fully educated who was ignorant of the processes, standards, and history of natural science, and that it was possible to give a general scientific training which should provide useful equipment and valuable mental exercise for all. It would be both feasible and beneficial for science to enter into all early education, with specialisation later where aptitude was shown. Public opinion has not yet put the teacher in his right place, or rewarded him sufficiently, yet only so can we foster the power for development and heroism latent in the ordinary man. Educational methods have great influence on the efficiency and contentment of workers, and a great modern commonwealth needs at its centre a democracy which shall be intellectually, socially, and morally educated.

The Headmasters' Conference, which is held