We have reproduced here this part of the introduction to their report by the Advisory Committee because it must interest men in every learned profession to have knowledge of work of this class carried out in connection with an International Exposition, illustrating fully and well what the work of such an exposition should be, truly a faithful record of the world's progress in the arts and industries, made in such a way as to be of use for all time. Such work has been attempted in other lines and in other expositions, but never on such a scale an dwith such practical and accurate results. The results published in this report are of universally greater interest to the mechanical engineer than to the working chemist but even to the latter class they are far from being without value, and many chemists in charge of works will be interested in the volume of data regarding the relation between fuel consumption and steam production and will be interested to learn that in the best types of locomotive boilers in these tests the weight of water evaporated per pound of coal consumed—water from and at 212° F.—varied from 5.5 to 12.5 pounds. Some of us will find comfort in these figures and relief from discouragement which has followed similar tests in the boiler plants of the works, to which the closest attention practicable has been given.

The volumes of results of analysis of fuels used in the tests are of interest and value as are the analyses of the smoke gases, while the methods of analysis will remain the standard for such work. The analyses of coals were made in accordance with the method decided on by the Committee of the American Chemical Society and given in Vol. 21, No. 12, of this Journal. Analyses were made of coal, sparks and ash. Altogether the work will be accepted as high authority by mechanical engineers and will, in very many ways, prove useful to working chemists as well.

The Pennsylvania Railroad System deserves the thanks of the scientific world for having carried out this splendid work and congratulations upon the splendid results obtained.

W. McMURTRIE.

THE UNITED-OTTO SYSTEM OF BY-PRODUCT COKE OVENS. United Coke and Gas Company, New York City, 1906.

As appears from the well-known compilations prepared by Dr. Edward W. Parker, and from Mr. John Fulton's standard treatise on coke, it was only about thirteen years ago that the first

plant of by-product coke ovens was erected in the United States. This plant was of the type known as Semet-Solvay ovens, and was installed at Syracuse, N. Y., in connection with the works of The Solvay Process Company. During the comparatively brief period that has since elapsed, the total number of by-product coke ovens constructed in the United States by the Semet-Solvay Company and the United Coke & Gas Company has risen to a total in excess of 3,000, which in 1904 produced about 11 per cent. of all the coke made in the entire country.

Among the plants thus far constructed are the Semet-Solvay ovens in Pennsylvania, West Virginia, Alabama, and elsewhere, for the Pennsylvania Steel Company, Tennessee Coal, Iron & Railway Company, National Tube Company, and others, while the United Coke & Gas Company has erected plants of the type known as the United-Otto ovens, for the Cambria Steel Company, Lackawanna Steel Company and Sharon Coke Company, in Pennsylvania, and for other concerns elsewhere, and the increase in the number of by-product ovens is being continued by the plant just completed by the Semet-Solvay Company at Chicago, which is about to be further enlarged; its new plant under construction at Steelton, Pa., for the Pennsylvania Steel Company, and the additions under way or recently completed at the United-Otto plants at Cambria, Pa., and Camden, N. J.

As is familiarly known, the chief advantages offered by the by-product oven over the old-fashioned type known as the "bee-hive," consist in the production of a larger percentage of coke, of equally high quality, and the saving of large quantities of gas in excess of that used for heating the ovens, together with tar and ammonia, and certain derived products. These advantages are discussed in an instructive and entertaining manner, from the point of view of the United Coke & Gas Company, in a very handsome and attractive volume recently issued by it. To the careful reader it will probably appear, however, that the claims there set forth are somewhat more optimistic than the actual facts may warrant. In many localities, for example, the market for fuel or illuminating gas is already fully supplied, and the total output of tar in the United States is now in excess of the demand. On the basis of an output of 9 gallons of tar per ton of coal carbonized, a moderate sized plant carbonizing say 1,000 tons of coal per day, would add to the present production of tar a further amount in

excess of three and one-quarter million gallons of tar per annum. And on the basis of an output of 5 pounds of ammonia (NH_3), equivalent to say 20 pounds figured as ammonium sulphate, per ton of coal carbonized, the same plant would add to the present production a further amount in excess of seven million pounds of sulphate per annum, so that any general and sudden increase in the number of by-product coke ovens would apparently result in depriving that type of construction, not only in the new plants but also in those previously erected, of the greater part if not all of the advantages resulting from its output of by-products, for these plants themselves involve a much larger initial investment, and thereafter cost more to operate, than those of the bee-hive type, the returns from the by-products being relied on, with the increased yield of coke, to cover these extra charges and show some net gain in the final result. In other words, it seems entirely probable that it is only in proportion to the gradual enlargement of the field in the marketing and use of tar and pitch, as well as ammonia, that the substitution of by-product for bee-hive ovens can be expected to take place. Nevertheless, the by-product oven has already established itself, within the commercial limits thus imposed, as a thorough success in the economical production of the best grades of coke, and as time goes on there will undoubtedly ensue a large but gradual increase in its use.

PHYSICAL CHEMISTRY FOR ELECTRICAL ENGINEERS. By J. LIVINGSTON R. MORGAN, PH.D. 230 pp. New York: John Wiley & Sons. Price: $1.50.

This work is as compact a compilation of the conceptions now constituting physical chemistry as could be connectedly written. In the reviewer's opinion it is so condensed that the average engineer would find a little trouble in understanding it. The first chapter deals with fundamental principles, among which are included the author's decision to use in his book the term "combining weight, meaning by it that combining weight which is usually designated as the atomic weight," and "formula weight," instead of the "so-called molecular weight." This is to free the work from any conception of an hypothesis or inaccuracy. This laudable ambition has, in general, cost as much or more than it is worth. The common terms of the average physical chemist are the ones which the electrical engineer ought naturally to wish to learn.