

temperature is reached, when a low pressure will be effective for the liquefaction required. Also, the much-discussed application of the Joule-Thomson effect or gain in the circulatory, self-cooling, expansion or sudden-release methods.

In the description of the experimental work of the past, and the practical methods of liquefaction now in use, all the workers in the field seem to have received their just meed of notice, and no signs of dispute about priority are given. A chapter is taken up with historical data, mention of papers, their dates of publication, etc., and the last entry records the communication of Dewar, to the Royal Society, May 10, 1898, reporting the production of liquid hydrogen and helium. In the last chapter are given the applications of liquefied gases, and certain ideas suggestive for chemists are found here such as the preparation of pure oxygen from liquid air, the possible use of liquefaction for separation or analysis of gases, for concentration of solutions, preparation of salts, etc. No thermometric or cryometric methods are mentioned except the mere reference to the use of a hydrogen thermometer by Olzewski. It is a curious sin of omission, as this is now a most promising field of physical research and pertinent to the author's subject. C. F. MCKENNA.

ELEMENTARY STUDIES IN CHEMISTRY. BY JOSEPH TORREY, JR., Instructor in Harvard Univ. New York: Henry Holt & Co. 12mo. 49 illustrations. viii + 487 pp.

Some years ago during a symposium on the teaching of chemistry Dr. F. W. Clarke remarked that the best method to be pursued depended altogether upon circumstances,—upon the age of the pupils, their previous training, etc. The statement contained a great deal of practical wisdom. Few teachers fail to be profoundly influenced by their environment. If they write textbooks for student use as Professor Torrey has done the nature of this environment becomes at once more or less evident. Professor Torrey has charge of the chemical instruction in the Summer School of Harvard University, and in preparing this book he has evidently had in mind the needs of the class of students who attend such schools—mainly teachers, with inadequate training, bent on self-improvement, willing and anxious to work, mature in years and experience.

The book bears ample evidence of great care in preparation. It is not too much to say of it that it contains one of the most carefully constructed and logical arguments from chemical fact to chemical theory that has ever been written.

In plan the idea is comprehensive. It is to teach the elements of all phases of chemical science. Nothing is shirked, and every point is clearly and sufficiently explained. Each day's work consists of two parts: Laboratory work which comes first and establishes the facts, and the lecture which follows, explains, systematizes, and enlarges on them. While the sequence of treatment is largely in accordance with the periodic law the author by no means binds himself to this order, considering the needs of the student of first importance.

The book contains a few slips in statement of facts, fortunately of small importance, and some infelicities of expression. These will doubtless be remedied in subsequent editions. Every teacher can learn something from Professor Torrey, and all should read his book.

E. H.

THE MINERAL INDUSTRY: ITS STATISTICS, TECHNOLOGY AND TRADE IN THE UNITED STATES AND OTHER COUNTRIES TO THE END OF 1898. EDITED BY R. P. ROTHWELL. VOLUME VII. New York and London: The Scientific Publishing Co. 1899. 4to. xxviii+982 pp. Price, \$5.00.

To the chemist and technologist the annual volumes of this series are of great interest and value, embodying as they do the latest progress in the different departments of metallurgy and mining. Much of the information is original and cannot be found elsewhere. Among the items of interest contained, it may be noted that the production of aluminum in the United States was 5,200,000 pounds. Ferromolybdenum was produced to the extent of 2,100 pounds, valued nominally at 50 cents per pound. Molybdenum was first produced in the United States to the amount of 9,550 pounds, worth about \$1.25 per pound. 33,200 pounds of metallic tungsten, 1,594,152 pounds of carborundum, 3,584,586 barrels of Portland cement of 400 pounds each, 185,647 pounds of artificial graphite, and 8 tons of molybdenite were produced in this year.

The volume contains a vast amount of information, of which it is impossible to give even a digest in the space available. There are articles, for instance, upon the manufacture of con-