

author, and can be recommended to all interested in the development of physical science. HENRY CARRINGTON BOLTON.

EXAMINATION OF WATER CHEMICAL AND BACTERIOLOGICAL. BY WILLIAM P. MASON. New York: John Wiley and Sons. London: Chapman and Hall, Limited. 1899. 135 pp. Illustrated. Price, \$1.25.

This book is divided into three parts: First, an introduction, pointing out the popular misconception of water analysis and emphasizing the necessity of knowing the source of the sample in order to properly interpret the result of the analysis. To this end, throughout the book, much matter is given to enable the analyst to pass upon the quality of a drinking-water from his analysis. Part two gives directions for sampling, and methods of chemical analysis. It is needless to say that these latter, coming from such an authority upon water analysis, as Prof. Mason, are of the best, and are well arranged. Part three deals with so much of the biological examination of water as is of most use to the chemist, leaving the wider field of ultimate differentiation to the biologist. RICHARD K. MEADE.

THE LIQUEFACTION OF GASES. BY J. CAURO. Paris: Gauthier-Villars. 1899. 83 pp.

This treatise on the liquefaction of gases has the thoroughness that one might expect if it were prepared for presentation to a class of students specializing in the subject. There is a cryogenic laboratory at Leyden; it is not hard to foresee the establishment of a chair of *cryogenics* at some enterprising university. But everyone at the present moment wants the thermodynamics of gases explained to him. It should be done scientifically, fully, and consecutively. The mathematics involved is anything but abstruse; the facts are entertaining and the story of the successive steps in its history positively fascinating. The work in review could hardly be more fitted to serve for such a purpose as a full scientific presentation of the subject.

The discussion of the physics of gases in the first chapter, of their curves near the critical-point and of isothermals, leads up to the discussion of the Joule-Thomson effect, and closes with a scheme of methods of refrigeration. It is interesting to note amongst these "the principle of cascades." This was the basis of Pictet's work. Another way of expressing it would be by successive falls in the critical-points of the liquids used, one being volatilized to chill the next, and so on until the required

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.