

potassium cyanide to proceed with the determination of the mercury. Time would be saved and disturbing constituents be eliminated by simply digesting the mineral with sodium sulphide, in which it is soluble, and after the removal of the insoluble parts by filtration, proceeding as directed under the determination of mercury. It is a great pity that literature references are omitted from the entire text.

Tables, showing the E. M. F. of various batteries, factors for the calculation of certain electrolytic data, electrochemical equivalents, the intensity of current expressed in volumes of electrolytic gas with their equivalents in amperes, resistances of metals and alloys, etc., etc., conclude the book, which is well printed and illustrated. It deserves a prominent place in electrolytic literature.

EDGAR F. SMITH.

PHYSICAL CHEMISTRY FOR BEGINNERS. BY DR. CH. VAN DEVENTER.

With an Introduction by PROF. J. H. VAN'T HOFF. Authorized American edition from the German edition, translated by BERTRAM B. BOLTWOOD. New York: John Wiley and Sons. 1899. x + 156 pp. Price, \$1.50

THE ELEMENTS OF PHYSICAL CHEMISTRY. BY J. LIVINGSTON R. MORGAN, PH.D. New York: John Wiley and Sons. 1899. viii + 299 pp. Price, \$2.00.

The reviewer has already¹ called attention to the need of a text-book on physical chemistry presenting the main facts and theories of this important branch of the science in a form not demanding too much preparation in physics or mathematics on the part of the student, and he is much pleased to note the appearance of these two books which go far towards filling this need. With such books at hand there is no reason why instruction in physical chemistry should not be given in even our smaller universities and colleges. A knowledge of the rôle that ions play in the reactions of analytical chemistry throws such a flood of light on that subject that it ought to be acquired by the student at the same time he is practising analysis in the laboratory. Instead of deferring the study of physical or theoretical chemistry until after courses in qualitative and quantitative analysis have been completed, it should be taken up along with them. The danger of work in analytical chemistry degenera-

¹ See the review of Clarence L. Speyers' "Text-Book of Physical Chemistry," in this Journal, 20, 389 (1898).

ting into mere routine and the acquisition of manipulative dexterity would certainly be avoided in a large measure by so doing.

These two books are in many respects complementary to each other. Boltwood's book is the more elementary, containing much that is usually given in good courses in beginning chemistry. In it but little space is devoted to methods, experimental or theoretical, and the treatment is strictly non-mathematical. The general plan is to state carefully laws and principles and then to illustrate them by remarks, historical, critical, etc.

Morgan assumes that the student has a knowledge of the rudiments of calculus, and to a not inconsiderable extent gives the mathematical derivation of many laws. He also sketches in broad outlines the chief pieces of apparatus and modes of using them, that have proved of such great service in the development of physical chemistry.

While Boltwood hardly more than touches upon the subjects of electrochemistry and ionization, Morgan treats of them excellently and at length, the doctrine of ions appearing all through his book. On the other hand, Boltwood takes up in some detail photochemistry and the periodic law, which are barely mentioned by Morgan.

Errors of importance are scarcely to be found in either book. As to the translation, although the translator in "closely following the German text in nearly all cases" (p. vi.) has in places let the German idiom appear too glaringly, yet on the whole he has succeeded in attaining a commendable smoothness and clearness of language. The reviewer would, however, deprecate the use of the expression "heat toning," inasmuch as heat effect expresses the same thing in good English.

The two books as issuing from the same publishing house are very similar in their make-up, the typography, presswork and binding being practically the same. C. E. LINEBARGER.

THE MICROSCOPY OF DRINKING WATER. BY GEORGE CHANDLER WHIPPLE. Biologist and Director of Mount Prospect Laboratory, Brooklyn, N. Y. First edition. New York: John Wiley & Sons. 292 pp.

It may without doubt be safely assumed that there are few water analysts who would not concede the value of a carefully conducted and intelligently interpreted microscopical examina-