

no free, white arsenic appears on treating the green with cold dilute hydrochloric acid. In this laboratory I have, for some time, treated such greens as show a tendency to separate out white arsenic as follows: The sample is treated with hydrochloric acid (approximately 0.5 N) solution and boiled gently. Five to 10 cc. of acid for each 0.1 gram of green is sufficient. No loss of arsenic by volatilization takes place unless the solution becomes concentrated to less than one-half its original volume. If solution is not effected, add a cold saturated solution of sodium acetate, using about 3 grams of the salt for each 0.1 gram of the green originally weighed out, and boil till all arsenious acid dissolves. The dilute acid dissolves all copper and what we may call "firmly combined white arsenic." The concentrated acetate solution dissolves all white arsenic left by the acid. The proportions of the two solvents may be varied to meet the requirements of individual greens, but all copper should be in solution before the acetate is added. After solution is effected, an alkaline tartrate and solid bicarbonate are added and the diluted solution titrated as usual.

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S. AVERY.

NEW BOOKS.

ANALYTICAL CHEMISTRY. Vol. I. QUALITATIVE ANALYSIS. By F. P. TREADWELL, PH.D., Professor of Analytical Chemistry in the Polytechnic of Zurich. Translated from the second German edition by WILLIAM T. HALL, S.B., Instructor in Chemistry, Massachusetts Institute of Technology. New York: John Wiley and Sons. 1903. Price, \$3.00.

This book is an amplified reproduction of the lectures on qualitative analysis that Professor Treadwell has delivered yearly at Zurich since 1882. The first German edition was issued in 1899 and met with such a favorable reception that it was followed two years later by a second edition which now appears in English form.

The general plan is that usually followed in text-books on this subject. Under the heading General Principles, an introduction of some thirty pages treats briefly of precipitation, oxidation and reduction, hydrolysis, mass action and the ion theory. The last two subjects are alluded to occasionally in the body of the text but are not made the basis of the method of presentation.

The chief feature of the work is the treatment of the action of the various reagents on solutions of pure salts. Explanations of the mechanism of these reactions are introduced in detail, in connection with which free use is made of equations and graphical formulas. The result is a valuable work for ready reference, especially valuable in that it embodies the ideas of a chemist of twenty years' experience in teaching the subject.

The book is an expansion of the old style text-book on the subject and its chief faults are inherent in the method of presentation. It is to be regretted that, with the exception of the pages in the introduction giving directions for the determination of the sensitiveness of reactions, there is scarcely a hint in the whole book that the majority of reactions cannot be represented quantitatively by an equation unless the conditions as to the temperature, concentration, etc., are allowed to vary only within relatively narrow limits. An occasional lack of conservatism of statement about reactions which are complicated and uncertain, or vary under slightly varying conditions, is also unfortunate. The impression is conveyed that such reactions have actually been proved to take place in the way explained and often a distinction is not drawn sharply enough between what is known to happen and what is supposed to happen. For example we find such statements as the following: "The oxidizing action of nitric acid depends upon the formation of the anhydride which then breaks down into nitric oxide and oxygen," page 4; "if an excess of hydrogen peroxide is used" in oxidizing chromic acid to chromium peroxide "a lively evolution of oxygen will ensue; the chromium peroxide as well as the hydrogen peroxide will be reduced. The oxygen comes from the hydrogen peroxide while the hydrogen of the latter is oxidized by the chromium peroxide to water," page 85.

These faults are especially noticeable in the supplement which treats of the rarer metals. Much of the matter here given has no place in a book of this sort. The reactions of the "pure" salts of these elements are of interest, if it is actually known what these reactions are; but a treatise on Qualitative Analysis which gives the impression to the student that the behavior of the rare elements is as definitely and exactly known as that of iron, and which, aside from a table giving a method of analysis for gadolinite, ignores the separation of these elements from the commoner ones, might better leave the whole field of the rarer elements untouched. We

note that "there are no characteristic dry reactions" of Thorium, page 16. Of the nine wet reactions enumerated, not one is characteristic. The only characteristic reaction of the element, that with a solution of potassium trinitride¹ containing hydronitric acid, is not mentioned. Under neodymium and praseodymium we find the statement "it is very difficult to separate these two metals from one another. It is accomplished only by repeated fractional crystallization of the ammonium double nitrate." The fact that the presence of another base, such as lanthanum, makes this separation possible in comparatively few crystallizations is not mentioned.

The proof-reading leaves something to be desired; but in a book that contains as many formulas and equations as this, an occasional error is almost unavoidable. That a few typographical errors in the first German edition should have survived not only the second edition in that tongue but a translation as well, is, however, surprising. Such errors appear in equations on pages 157 and 206. Of other errors may be cited the precipitation of cobalt by potassium nitrate, page 143, and the use of nitric for hydrochloric acid on page 235, line 9. In general, the methods used in the separation and detection of the elements have been well chosen. Hillebrand's method for the detection of the vanadium is introduced in this edition. The only seriously faulty method which strikes the eye is that for the detection of hydrochloric acid in the presence of hydrobromic and hydriodic acids. This is attempted by fractional precipitation of the silver salts until finally a white precipitate is produced. The adoption of a test of this sort is inexcusable when we have at our command the excellent separations based on the oxidation of hydrobromic and hydriodic acids by appropriate oxidizing agents.²

The plate of the spectra is very poor, but the typography and press work of the book are good, and the translation has been well done.

THEODORE WHITTLESEY.

RADIUM AND OTHER RADIO-ACTIVE SUBSTANCES, ETC. BY WILLIAM J. HAMMER, Consulting Electrical Engineer. New York: D. Van Nostrand Company. Price, \$1.00.

This booklet of 72 pages represents a lecture delivered before a joint meeting of the American Institute of Electrical Engineers

¹ L. M. Dennis: *This Journal*, 18, 947.

² See Hart: *Am. Chem. J.*, 6, 346; Benedict and Snell: *This Journal*, 25, 809.