

twenty-five per cent. of the methane and fifty per cent. of the oxygen are consumed.

(5) The method of determination of the gases by one explosion with air gives results not within nine-tenths per cent. of the methane and seven and five-tenths per cent. of the hydrogen.

In concluding this article we would express our indebtedness to Mr. R. B. Price for preliminary work which served as the foundation of this thesis.

NEW BOOKS.

A MANUAL OF QUALITATIVE CHEMICAL ANALYSIS. BY E. P. HARRIS, PH.D., LL.D., Professor of Chemistry in Amherst College. New edition. Thoroughly revised and corrected. Amherst, Mass.: Carpenter & Morehouse. 1895. pp. 308. Price \$1.50.

The author of this book is a veteran teacher, and this new edition is the result of the experience of his laboratory teaching for over a third of a century. The book is divided as follows:

Part I. Examination of solutions: Sec. I, Bases; Sec. II, Acids.

Part II. Examinations of solids.

Part III. Qualitative separations: Sec. I, Bases; Sec. II, Acids.

Supplement: Reaction of rare elements; Use of the spectroscope in analysis.

Appendix: Preparation of reagents; Table of solubility; Index.

Part first gives the reactions of each of the metals and acids, and is interleaved that the student may write out the reaction-equations on the blank pages. This is intended to be used in connection with unknown solutions containing a single base and acid.

Part second is a guide to the systematic examination of solids according to the plan which was first introduced by the author and has since been very generally adopted. This is perhaps the most valuable part of the book.

Part third takes up the separations of metals systematically, using the methods which have proved most satisfactory in the Amherst laboratory. Alternate methods are in a number of instances given, but generally only a single method; the idea is to avoid confusing the student with a number of different ways of working, the relative merits of which he is incapable of estimating. This part is very complete, covering practically all cases

with the common metals and acids, while it is well supplemented by a very comprehensive chapter on the reactions of the rare metals.

The appendix on the preparation of reagents will be found useful to teachers.

This manual is not intended to merely make the student a good analyst; it is rather a manual of instruction in chemistry through the medium of qualitative analysis. It is not a book for self-instruction, but it is intended that the student shall have the constant supervision of an instructor. As a manual for college students it does not appear to be too much to say that of all the many books of its class it is the best.

JAS. LEWIS HOWE.

PRINCIPLES AND PRACTICE OF AGRICULTURAL ANALYSIS. BY HARVEY W. WILEY. VOL. II. FERTILIZERS. Cloth, 8 vo. pp. 332. Easton: Chemical Publishing Co. 1895. Price, \$2.00.

The official inspection of fertilizers involves such great pecuniary interests that the chemical methods used for the purpose are matters of the highest importance to analyst and manufacturer. All countries in which fertilizers are used to any extent have some plan of inspection and certain methods of conducting the chemical work required. These methods are the result of very numerous and often difficult investigations of the men best qualified to deal with the subject.

In the volume under consideration the subject of fertilizers is treated under four heads: (1) Phosphates and phosphatic fertilizers; (2) Nitrogen in fertilizers and fertilizing materials; (3) Potash in fertilizing material and fertilizers; (4) Miscellaneous fertilizers, lime, gypsum, ashes, coarse manures, etc.

The matter of drawing samples of various materials receives a deservedly large share of attention. Then the analytical work proper is taken up and treated very fully and clearly. The different analytical methods of various countries are given in full and a brief but very valuable discussion of the merits of the methods follows. In many cases the value of the discussion is increased by full statements of analyses.

The matter thus brought together consists of both original matter and material published at home and abroad; and often published in such a way as to be now inaccessible to many workers on the subject.