of phosphorus pentoxide in the sample, and shake vigorously by hand. Mechanical shaking is of but slight advantage. The precipitate will settle out clear very quickly. Filter with suction through a 9 cm. filter-paper. Wash the precipitate free from acid with water, making no effort to remove the precipitate from the flask. The washing will take about two minutes. Test the filtrate by adding more ammonium molybdate solution and heating to 65° C. Transfer the precipitate and filter-paper to the Erlenmeyer flask, and run in standard alkali until the yellow precipitate is nearly dissolved. Shake to disintegrate the filter-paper. Now add 1 cc. phenolphthalein solution as indicator and continue adding the alkali cautiously until the pink color remains permanent for about a minute. The end-reaction is very sharp. In case an excess of alkali is added it can be titrated back with standard acid. Divide the burette reading by two and the result will be the per cent. of P_2O_5 in the sample.

Preparation of Reagents.

(*a*) Molybdic Solution: This solution is made as directed in Bulletin No. 46, Revised Edition, U. S. Department of Agriculture, Division of Chemistry, except that the solution is heated for five hours in a bath of water at a temperature of 65° to 67° C.

(*b*) Standard Potassium Hydroxide Solution: This is prepared by diluting 323.81 cc. of normal potassium hydroxide, free from carbonates, to 1 liter. One cc. is equal to 1 mg. phosphorus pentoxide.

(*c*) Standard Sulphuric Acid Solution: The strength of this solution is the same as that of the standard alkali.

(*d*) Phenolphthalein Solution: One gram of phenolphthalein is dissolved in 100 cc. of 50 per cent. alcohol. A. L. EMERY.

New Apparatus in Water Analysis.—In the June number of this Journal (p. 537) Messrs. Thomas and Hall describe under the above heading an apparatus for collecting samples of water for the determination of dissolved oxygen or carbon dioxide. While the apparatus may be a convenient one for this purpose, it seems a just criticism to point out that samples collected in this way will not represent the exact character of the water being tested and that, too, where results of the greatest accuracy possible are required. Suppose the sample is to be collected from the bottom of a deep pond where the oxygen at most amounts to only a few tenths per cent. of saturation. The entering water will come in contact with the air in the bottle and will undoubtedly absorb some oxygen. It has been found in our work that when the dissolved oxygen content of the water is very low it is always necessary to aspirate through the calibrated bottle *at least several times its volume* of the water in order to be sure that the first portions entering the bottle shall be completely displaced. In the apparatus described no provision is made for this and it will be evident that in such cases the results will not be accurate. The same criticism will apply, though perhaps not with the same force, to determinations of carbon dioxide made on samples collected in this way.

A. G. WOODMAN.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
BOSTON, MASS, June 10, 1902.

NEW BOOKS.

GRUNDRISS DER QUALITATIVEN ANALYSE VOM STANDPUNKTE DER LEHRE VON DEN IONEN. BY DR. WILH. BÖTTGER. Leipsic. 1902. 250 pp. + 15 pp. of tables.

This book may be briefly characterized as an interpretation in detail of the usual scheme of qualitative analysis with the help of the Laws of Chemical Equilibrium and the Ionic Theory. It differs from Ostwald's "Scientific Foundations of Analytical Chemistry" in the respect that the theoretical principles involved are gradually introduced in connection with the analytical procedure, instead of as an introduction to it; and in the respect that it is intended to serve as a working manual for a course of qualitative analysis, rather than as an accompaniment to such a course. It differs from the recent treatise of Treadwell on the same subject in that it is far less extensive and complete on the experimental side, and in that the theoretical interpretation of the reactions is given greater prominence. In fact, the point of view from which the book is written would seem to make it fitted to teach laws and theoretical principles with the help of qualitative analysis, rather than qualitative analysis with the help of the principles. And, correspondingly, for the training of exact analysts, the book can not be said to be fully satisfactory; for the conditions for securing