

a sufficient number of results comes nearer representing actual practice than anything else that has been proposed.

Each of the following figures is an average of three results and represents the loss in milligrams sustained by flasks when tested as described:

LOSS PER FLASK EXPRESSED IN MILLIGRAMS.

	Whitall-Tatum Co.	Kavalier.	Jena.	New glass.
One per cent. sodium carbonate solution	134.4	126.6	30.6	32.3
Water	8.4	20.6	1.1	0.7
Two-fifths per cent. hydrochloric acid solution	4.7	16.2	1.3	1.5
One per cent. sodium hydroxide solution	100.1	78.4	97.1	89.0
Total loss.....	247.6	241.8	130.1	123.5

The variations between the new glass and the Jena glass are, with the exception of the solubility in 1 per cent. sodium hydroxide solution, within the limits of factory practice. In resisting caustic soda solution, however, the new glass is undoubtedly superior to the Jena glass.

It may not be out of place at this time to call attention to the fact that beakers made of either the new glass or Jena glass can be used for evaporations on the water-bath without danger of cracking. A few tests of beakers made from other kinds of glass will convince one that very few pieces will stand exposure to steam for more than fifty hours. I have exposed beakers of both the new and Jena glass to the action of steam for over 200 hours continuously, without any sign of fracture appearing.

CHEMICAL LABORATORY OF WHITALL TATUM COMPANY,
June 4, 1902.

NOTES.

Rapid Volumetric Method for Determining Phosphoric Acid in Fertilizers.—In describing the following volumetric method for the determination of phosphoric acid in fertilizers and fertilizing materials very little that is strictly original is claimed. The method is a modification of the volumetric method as published by the Association of Official Agricultural Chemists. The most important change consists in shaking the solution after adding the ammonium molybdate.

Under ordinary conditions the method can be completed in about thirty minutes from the time the sample is received at the laboratory. A great many determinations have been made in twenty minutes which agreed in duplicate to the second decimal place and which did not vary over 0.1 per cent. from a careful gravimetric determination. Over 3000 determinations have been made by the method during the regular work of the laboratory on samples ranging from 1 per cent. up to 47 per cent. phosphoric acid. Between these very wide limits it seems to be all that could be desired both for rapidity and accuracy.

The following table will illustrate the very close agreement of duplicate determinations with each other and with the gravimetric method of the Official Agricultural Chemists.

Two grams of the sample were digested and made up to 250 cc.

	Time taken in making determination.	Aliquot part in grams.	Per cent. of phosphorus pentoxide	
			by volumetric method.	by gravimetric method.
1. 10 cc. used	20 minutes	0.08	15.05
2. 15 cc. used	30 minutes	0.12	15.00
3. 20 cc. used	0.16	15.04
4. 25 cc. used	1 hour	0.20	15.00
5. 30 cc. used	{ Yellow precipitate stood over night	0.24	14.94

Method: Weigh 2 grams of the prepared sample into a 200 cc. beaker, add about 10 cc. strong hydrochloric acid, mix by shaking, wash down the sides of the beaker with about 10 cc. of water, cover the beaker with a watch-glass, and boil briskly. With the watch-glass slightly raised, add slowly from 1 to 2 grams of sodium chlorate or enough to decompose the organic matter excepting fat. Boil off the excess of free chlorine. Dilute with water and transfer the contents of the beaker to a 250 cc. measuring flask. Cool and make up to the mark. In case no fat is present, filtration is usually unnecessary as a small amount of insoluble residue will not influence the titration. Transfer an aliquot part of 25 cc., representing 0.2 gram of the original sample, to a 200 cc. Erlenmeyer flask, add 15 cc. ammonia (sp. gr. 0.90) and a small piece of litmus paper. Neutralize the ammonia with strong nitric acid, using a slight excess only. The temperature of the solution is now about 65° C. If more than 2° or 3° above this temperature add cold water to bring it down to 65° C. Now add from 25 cc. to 75 cc. ammonium molybdate solution, depending on the amount

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