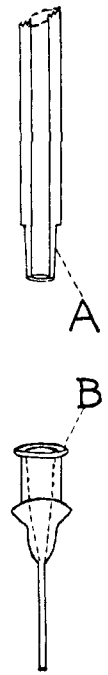
A Pipet for Micro-Analyses.—The accurate delivery of small amounts of fluid is essential for micro-analyses. Folin[1] has stated that the Ostwald pipet is accurate to the order of 0.1%. Van Slyke and Neill[2] have improved this. They calibrate between marks and place a stopcock under the bottom mark. Their pipet is excellent for introducing fluids into the Van Slyke gas apparatus but is not equally practicable for other uses. Unless the end is washed a variable and unknown amount of fluid clings to the tip.

The pipet which we use is a modification of Van Slyke's, with a glass Luer adapter sealed to the bottom end. This ground end fits snugly into a hypodermic needle B of small gage, 18–23, which is cut off horizontally and ground on a stone. Trevan and Bainbridge[3] have shown that drops of the order of 0.00015 cc. can be removed from such a needle tip. For corrosive liquids a platinum needle may be used.

A test of the amount delivered indicated a surprising degree of accuracy. One worker obtained for a given pipet the following weights of water: 0.9982, 0.9981 and 0.9980 g. A second investigator weighed the water delivered from the same pipet as 0.9982 and 0.9983 g.



A, ground glass Luer adapter which fits into B; B, a hypodermic needle. Drawing is actual size.

Fig. 1.

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Apparatus for Micro-Filtration.—The centrifuge tube technique for the separation and washing of precipitates has been very useful for micro-analyses. In the course of development of a method for potassium, however, a small amount of material was lost when the supernatant fluid was poured off. To overcome this difficulty the following form of apparatus was devised (Fig. 1).

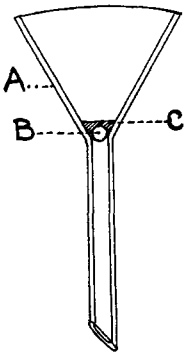
The principle is that of a Caldwell crucible. The filter is made by mounting a one inch funnel in a Witt filtering apparatus (this is essentially a suction flask with a ground glass removable top so that the filtrate may be recovered in a small inner container. If the precipitate only is to be saved, an ordinary suction flask is satisfactory). Into the

[1] Folin, *J. Biol. Chem.*, **21**, 198 (1915).

[2] Van Slyke and Neill, *ibid.*, **61**, 532 (1924).

[3] Trevan and Bainbridge, *Biochem. J.*, **20**, 423 (1926).

funnel, A, a glass pearl, B, is dropped and over the bead is poured a suspension of finely shredded asbestos, C, to form a layer about $^1/_{32}$ of an inch thick. The mat is allowed to drain and suction is applied (see Fig. 1).



A—one inch glass funnel; B—small glass pearl or bead; C—mat of fine grained asbestos. Drawing is $^3/_4$ actual size.

Fig. 1.

The precipitate and mother liquor are transferred to the micro-filter and the filtrate is removed by gentle suction. One drop of fluid is sufficient to wash the precipitate on the mat. With intermittent suction a precipitate can easily be washed five to ten times with one cc. of solution.

To remove the precipitate the funnel is inverted and a glass rod is inserted into the stem. Precipitates such as calcium, sodium, potassium, phosphorus, etc., that are to be dissolved before determination may be dissolved either on the mat, or in a separate container after removal together with the mat. In the latter case, a second filtration through the same apparatus gives a solution free of asbestos.

The materials for this micro-filter are at hand in every laboratory. They are inexpensive. During a year of use not a single determination has been lost.

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CORRECTION

Through the work of Paul S. Roller[1] it has come to my attention that the signs of two terms in Equation 10 of my paper on titration[2] are incorrectly recorded. The term $3K_WK_A^{-2}$ in the coefficient of $(H^+)^3$ should be negative, as should also the last term of the equation. I wish also to confirm the result obtained by Roller by an independent method concerning the limiting strength of acid necessary for appearance of an inflection in titration with a strong base, the values of the ionization constants given in my paper for this case being too large, due to a numerical error, by one power of ten.

E. D. EASTMAN

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[1] Roller, THIS JOURNAL, **50**, 1 (1928).
[2] Eastman, *ibid.*, **47**, 332 (1925).