Paper Fraction Analyzer

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(Received March 6, 1954)

Since its invention, the fraction collector proved to be widely applicable in various fields of chemistry. The authors tried to construct a very simple apparatus (see Fig. 1) capable of collecting fractions drop by drop on a long moving strip of filter paper[1], and obtained satisfactory results. The drops of the liquid collected on the filter paper were treated by suitable techniques such as are used in paper chromatography.

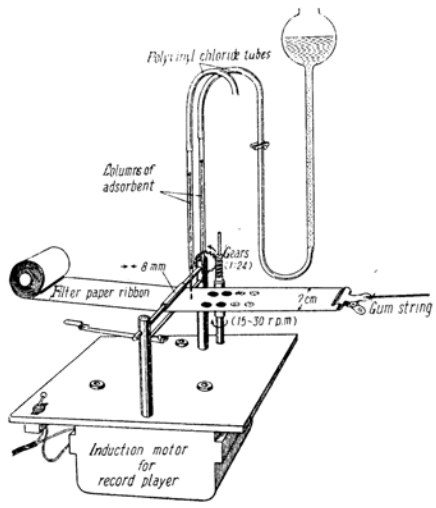

Fig. 1 "Paper fraction collector"

Using a small amount of ion-exchange resin as adsorbent, different metallic ions[2] were collected separately on different parts of the moving paper, as may be seen in Fig. 2. After spraying them with ammonium sulfide solution, the strips of the filter paper were dipped in melted paraffin in order to make the filter paper transparent and in order to stabilize the colors, and the metallic sulfides on the paper were estimated colorimetrically. The coloration is proportional to the concentration of dropped solution, provided that it is not less than 0.030 M/l.

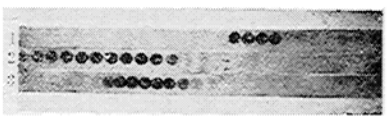

Fig. 2 Strips of filter paper, the colorimetric data of which are shown in Fig. 3. (photographed under ultraviolet light) 1—HgS, 2—CdS, 3—CuS.

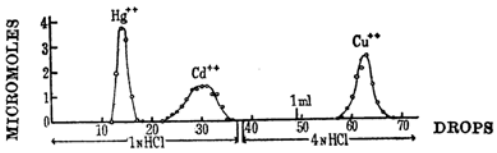

Fig. 3 Separation of Hg^{++}, Cd^{++} and Cu^{++} ions by the paper fraction analyzer. 10 micromoles each of mercuric, cadmium and cupric ions were adsorbed on a column of 0.45 ml. (5.1 cm. in height) of Amberlite IR 120 (180–250 mesh) from sulfates solution (0.033 M/l respectively) in 0.31 N nitric acid. After washing with distilled water, the cations were eluted by hydrochloric acid (1 N and 4 N) at a velocity of 1 drop per minute.

Fig. 4 shows the result of an experiment

1) B. Drake, *Nature*, **160**, 602 (1947).
2) R. Wickbold, *Zeit. anal. Chem.*, **132**, 26 (1951).

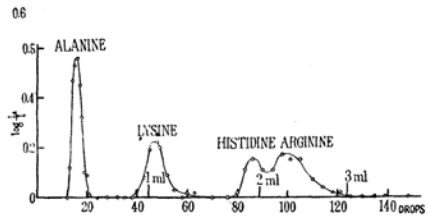

Fig. 4 Separation of amino acids by the paper fraction collector. 1 Micromole each of alanine, lysine, histidine and arginine were chromatographed by a column of Amberlite XE 64 (0.24 ml., 5.0 cm. in height) with a buffer of *p*H 5.95 (mixture of 0.2 M sodium citrate buffer and 0.2 M sodium phosphate buffer at the ratio of 2:1 in volume[4]) at the same rate as in the above experiment.

by this "paper fraction analyzer" in which basic amino acids and alanine were separated by Amberlite XE 64[3,4]. The amino acids on the filter paper were colorimetrically determined after treatment with ninhydrin solution[5] and melted paraffin. Amino acid-ninhydrin coloration thus treated did not change for several months.

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3) C.H.W. Hirs, S. Moore, and W.H. Stein, *J. Biol. Ckem.*, **200**, 493, (1953).
4) S. Ishii, and T. Ando, "Symposium on Biological Chemistry", October, 1953 (Tokyo).
5) R.R. Redfield, and E.S.G. Barron, *Arch. Biochem. and Biophys.*, **35**, 443 (1952).