NOTES

Modified Capillary Dilatometer for Solubilization

The solubilization of macromolecules is a problem of considerable interest. In studies of solubilization of macromolecules, measurement of change of volume is a very simple and fundamental physical experiment. An instrument which measures this volume change is valuable in studying the mechanism of solubilization.

A simple device for measuring volume change was previously described.[1] This instrument for measuring volume change, in which the sample is held in a vessel provided with two taps, on the top and at the end of the vessel so that a polymerization does not contribute to the solubilization, has been somewhat modified to render it more versatile in use, the latest form being described below.

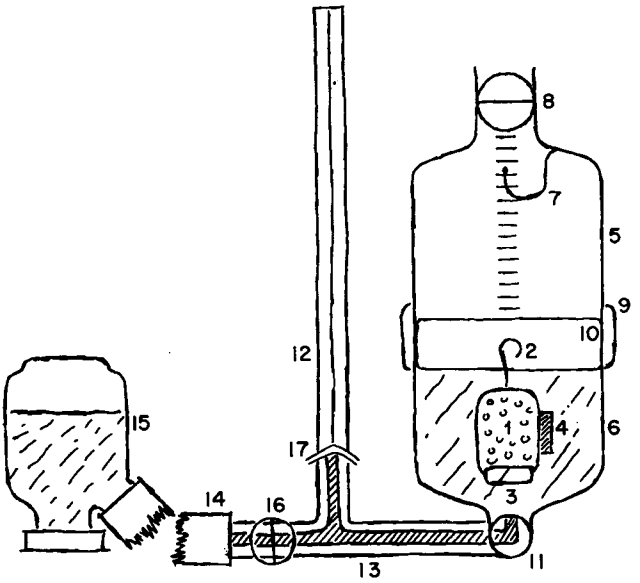

Fig. 1. Schematic diagram of dilatometer.

The present form of this instrument utilizes a two-part vessel, for a poor and a good solvent, respectively, in lower and upper portions, and a mesh bottle to hold the sample in the vessel can be brought to the desired position by a magnetic device. The instrument permits a complete volume change curve of high accuracy to be constructed.

The sample is placed in a mesh bottle (1, Fig. 1) having a fastener (2), a cap (3), and a magnet (4) attached to the body. The vessel has two parts (5, 6); one part of the vessel (5) with a scale has a tap (8) at the inlet for a solvent and hook (7) to attach the mesh bottle. Vessel 5 is connected by means of its socket (9) to a cone (10) to the other part of the vessel (6). Vessel 6 has a tap (II) which is connected to a capillary tube (12) of the dilatometer by means of a capillary system (13) with mercury.

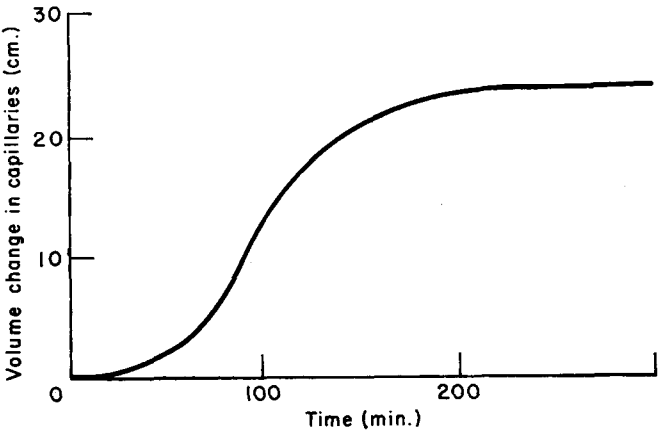

Fig. 2. Typical volume change–time curve.

In measuring the volume of the sample, tap 11 is closed, the mesh bottle 1 containing sample is set in the lower position, and vessels 5 and 6 filled with poor solvent and good solvent, respectively. By changing the position of a mercury reservoir (15) and opening taps 11 and 16, mercury is forced through a tube (14) into the capillary system (12, 13, and vessels 5 and 6. After the volume of the good solvent is measured, taps 8 and 16 are closed, and the initial mercury level of the capillary tube 12 is measured by manual or automatic operation. Then, the mesh bottle 1 is brought to the hook 7 in vessel 5 containing the good solvent and fastened by means of a magnet 4.

The construction and measurement procedure for this dilatometer is in all other respects the same as described previously.

Very good volume change–time curves are obtained by use of this instrument (Fig. 2).

Reference

1. M. Nisizawa, *J. Appl. Polymer Sci.*, **11**, 1613 (1967).

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