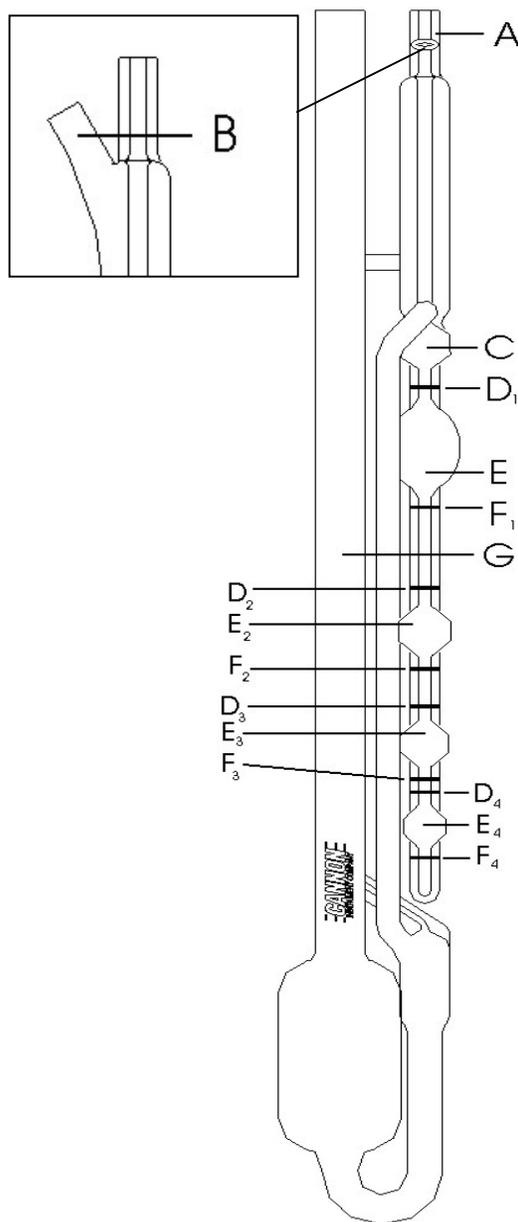


# Instructions for the use of The Cannon-Ubbelohde Four-Bulb Shear Dilution Viscometer

See also ASTM D 445, D 446 and ISO 3105



1. Clean the viscometer using suitable solvents, and by passing clean, dry, filtered air through the instrument to remove the final traces of solvents. Periodically, traces of organic deposits should be removed with chromic acid or non-chromium cleaning solution.
2. If there is a possibility of lint, dust, or other solid material in the liquid sample, filter the sample through a fritted glass filter or fine mesh screen.
3. For dilution work charge a measured volume of sample (10.00 ml) directly from the pipette through tube G into the lower reservoir of the viscometer. If dilutions are not to be made, it is not necessary to measure the volume of the sample.
4. Place the viscometer into the holder, and insert it into the constant temperature bath. Vertically align the viscometer in the bath if a self-aligning holder has not been used.
5. Allow approximately 20 minutes for the sample to come to the bath temperature.
6. Place a finger over tube B and apply suction to tube A until the liquid reaches the center of bulb C. Remove suction from tube A. Remove finger from tube B, and immediately place it over tube A until the sample drops away from the lower end of the capillary into bulb I. Then remove finger and measure the efflux time.
7. To measure the efflux time, allow the liquid sample to flow freely down past mark D, measuring the time for the meniscus to pass from mark D to mark F.
8. Without recharging the viscometer, make check determinations by repeating steps 6 and 7.
9. Calculate the viscosity of the sample by multiplying the efflux time by the viscometer constant.
10. Calculate the shear rate at the wall for each bulb by dividing the shear rate constant by the flow-time in seconds.
11. Dilute sample by adding measured quantity of solvent from pipette directly into the lower reservoir of the viscometer. Mix the original sample and the solvent by applying slight pressure to tube B several times, and shaking the viscometer.
12. Repeat steps 5 and 10. Additional dilution may be made if necessary.

RECOMMENDED VISCOSITY RANGES FOR THE CANNON-UBBELOHDE FOUR-BULB SHEAR DILUTION VISCOMETER

Size	Kinematic Viscosity Range	
	mm <sup>2</sup> /s <sup>2</sup> , (cSt/s)	mm <sup>2</sup> /s, (cSt)
25	0.002	0.3 to 2.0
50	0.004	0.8 to 4.0
75	0.008	1.6 to 8.0
100	0.015	3 to 15
150	0.035	7 to 35

The expanded uncertainty with 95% confidence of the calibration measurements relative to the primary standard is as follows:

Range of Constants mm <sup>2</sup> /s <sup>2</sup>	Expanded Uncertainty
up to 5	" 0.34%
5 to 50	" 0.45%
Greater than 50	" 0.69%

The assigned uncertainty of the primary viscosity standard at 20EC is " 0.17%. See ISO 3666.

THIS PRODUCT WAS CALIBRATED WITHIN A QUALITY SYSTEM WHICH IS REGISTERED TO ISO 9002.

CANNON INSTRUMENT CO. P. O. BOX 16 STATE COLLEGE, PA. 16804

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