## Instructions for use of the Cannon-Fenske Opaque Viscometer

1. In a separate container filter the test sample through a fine mesh screen to avoid any chance of particle contamination.

2. To charge the sample into the viscometer, invert the instrument and apply suction to tube **G**, immersing tube **A** in the liquid sample, draw the liquid into the capillary **F**. Adjust the liquid to mark **E**, turn the instrument to its normal vertical position and wipe clean.

3. Place viscometer tube in self-aligning holder in bath. When the liquid begins to fill bulb **B**, stop the flow by plugging tube **A**.

4. Allow approximately 10 minutes for the sample to reach the bath temperature of 40°C and 15 minutes for a bath temperature of 100°C.

5. To measure efflux time, remove the stopper from tube **A**, and measure the time for the leading edge of the meniscus to pass the from mark **H** to mark **I**. Using a second timer, measure the time required from mark **I** to mark **J**.

6. Calculate the kinematic viscosity of the sample in centistokes by multiplying the efflux time for bulb **C** times the constant for the lower bulb using Equation 1.

7. Check the results by repeating step 6 for bulb **D**, using the upper bulb constant in Equation 2.

Cannon Fenske
Opaque Viscometer
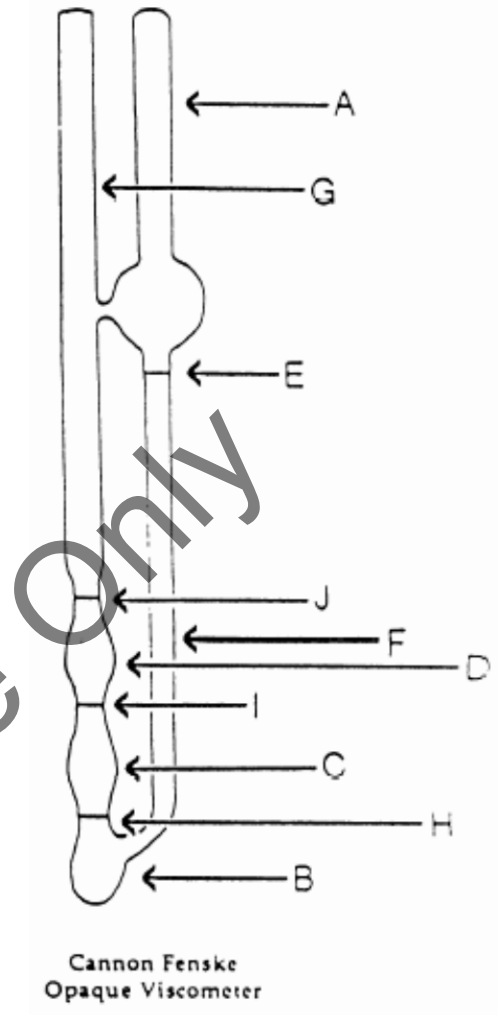
$$v_1 = t_c C_L \qquad\qquad (1)$$
$$v_2 = t_D C_U \qquad\qquad (2)$$

Where: v_1 = kinematic viscosity for the lower bulb [cSt, mm^2/s]
v_2 = kinematic viscosity for the upper bulb [cSt, mm^2/s]
t_C = mean time for bulb **C** [s]
t_D = mean time for bulb **D** [s]
C_L = lower bulb constant
C_U = upper bulb constant

8. Calculate the dynamic viscosity in centiPoise by multiplying the kinematic viscosity in centiStokes by the density of the material at the test temperature using Equation 3.

$$\eta = \upsilon_n \rho \qquad\qquad (3)$$

Where: η = dynamic viscosity [cP, mPa·s]
v_n = kinematic viscosity [cSt, mm²/s]
ρ = density of the liquid [kg/m³]

Table 1: Constants for Cannon-Fenske Viscometer Tubes

Cannon - Fenske Opaque Viscometer Tube Constants							
Size	Tube ID #	Constants @ 40°C	Constants @ 40°C	Constants @ 100°C	Constants @ 100°C	Rang of Viscosities		
		Upper Bulb	Lower Bulb	Upper Bulb	Lower Bulb	Centistokes		
25	205	0.001419	0.001975	0.001430	0.001986	0.5	to	2
50	267	0.002801	0.004050	0.002822	0.004073	0.8	to	4
100	1499	0.010760	0.015910	0.010840	0.016000	3	to	15
100	1498	0.009940	0.014510	0.010020	0.014590	3	to	15
150	1508	0.258600	0.035190	0.026060	0.035390	7	to	35
150	1509	0.025060	0.037050	0.025250	0.037260	7	to	35
200	1467	0.069200	0.097200	0.069800	0.097800	20	to	100

1. SIGNATURES OF UNDERSTANDING

By signing this form I acknowledge that I have read and understand this SOP, as well as the applicable MSDS's and that I will conduct myself in accordance with this SOP and the general laboratory rules.

NOTE: ALL SIGNATURES MUST BE PRESENT ON THE SOP LOCATED IN THE YELLOW BINDERS IN ROOM 2C26, other SOP's are made available for convenience only. Printed SOP's are valid for 24 hours only, after that time their accuracy must be verified with the **OFFICIAL VERSION** in room 2C26.

Name (Print)	NSID	Dep't	Signature	Date

2.   VERSION HISTORY

Handwritten amendments to the official procedures can be made by a single line through the text, along with the date, and initialed by the authorized individual making the correction. Changes are to be noted below. Formal changes to this SOP are made on the date of revision or sooner, where required.

Section	Changes Made	Date	Initials