CAPILLARY VISCOMETER METHOD

PRINCIPLE

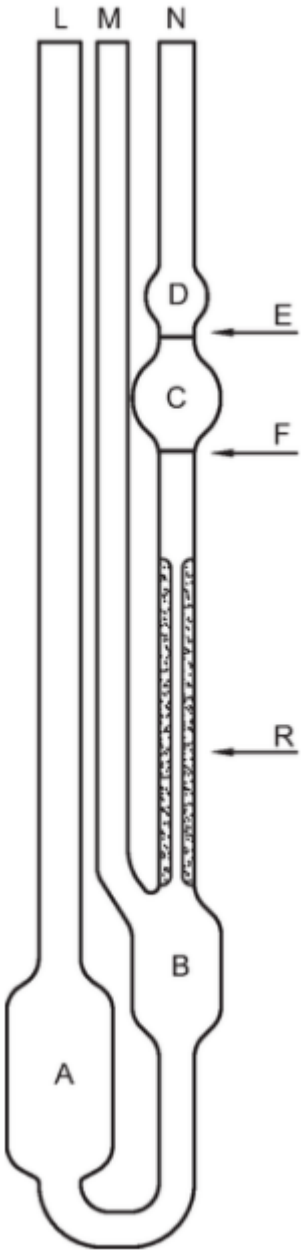
The determination of viscosity is carried out using a suspended-level (Ubbelohde-type) capillary viscometer of appropriate size at a temperature of 20.0 ± 0.1 °C, unless otherwise prescribed. The time required for the level of the liquid to drop from one mark to the other is measured. The flow time of the liquid to be examined is the mean of 3 consecutive measurements. The result is valid if the relative standard deviation of the 3 measurements is not more than 2.0 per cent.

2. The choice of the viscometer size

Size number	Constant of viscometer [$mm^2.s^{-2}$]	Kinematic viscosity range [$mm^2.s^{-1}$]
1	0.01	3.5 to 10
1a	0.03	6 to 30
2	0.1	20 to 100
2a	0.3	60 to 300
3	1.0	200 to 1000
3a	3.0	600 to 3000
4	10	2000 to 10 000
4a	30	6000 to 30 000
5	100	20 000 to 1000 000

Select a capillary viscometer of appropriate size according to the assumed viscosity of the measured sample to obtain a minimum flow time of 200 s.

METHOD OF MEASUREMENT



1. Charge the viscometer through tube L with a sufficient quantity of the liquid to be examined (previously brought to 20 °C unless otherwise prescribed) to fill bulb A while ensuring that the level of liquid in bulb B is below the exit to ventilation tube M.

2. Immerse the viscometer in the upright position in a water-bath at 20.0 ± 0.1 °C (unless otherwise prescribed) and allow to stand for not less than 30 min to allow the temperature to reach equilibrium.

3. Close tube M and draw the level of the liquid in tube N up to a level about 8 mm above mark E.

4. Keep the liquid at this level by closing tube N and opening tube M.

5. Open tube N and, using a stopwatch, measure the time required, to at least the nearest 1/5 of a second, for the level of the liquid to drop from mark E to mark F.

The flow time of the liquid to be examined is the mean of 3 consecutive measurements. The result is valid if the relative standard deviation of the 3 measurements is not more than 2.0 per cent.

CALCULATION

Calculate the *kinematic viscosity* v in square millimetres per second [$mm^2\ s^{-1}$] using the following expression:

$$v = k\,t$$

Calculate the *dynamic viscosity* η in millipascal seconds [mPa·s] using the following expression:

$$\eta = k \times \rho \times t$$

t flow time of the liquid to be examined, in seconds
k viscometer constant, in square millimetres per second squared
ρ density of the liquid to be examined at the temperature used for the viscosity measurement, in milligrams per cubic millimetre

RESULTS

Sample name:

Time [min:s]			
Average [s]			
Viscometer constant [$mm^2\ s^{-2}$]			
Kinematic viscosity [$mm^2 \cdot s^{-1}$]			
Density [$g \cdot cm^{-3}$]			
Dynamic viscosity [mPa·s]			