Date _____

Expt. No. 1 Page No. _____

Aim: To determine the viscosity of a given liquid using ostwald viscometer at room temperature

Apparatus required: 1. Ostwald viscometer
2. Specific gravity bottle
3. Stop watch
4. Thermometer
5. Stand clamp

Chemical required: i) Water
ii) Given liquid
iii) Chromic acid

Principle:- The pressure 'P' applied for driving the liquid of viscosity coefficient 'η' through a capillary tube depends upon a height 'h', density 'd' and the gravitational force 'g' i.e $\eta \propto hgdt$ — (i)

From Poiseuilles equation: $\eta \propto pt$ — (ii)

If η_1 and η_2 be the viscosity co-efficient of two liquid d_1 and d_2 be their densities, t_1 and t_2 be the time of flow then, $\eta_1 \propto hgd_1t_1$ — (iii)

$\eta_2 \propto hgd_2t_2$ — (iv)

Now devicling equation (ii) by (iv)

$$\frac{\eta_1}{\eta_2} = \frac{d_1t_1}{d_2t_2} \quad \text{—— (v)}$$

$$\eta_1 = \frac{d_1t_1\eta_2}{d_2t_2}$$

for water $\eta_2 = 0.0081$ poise

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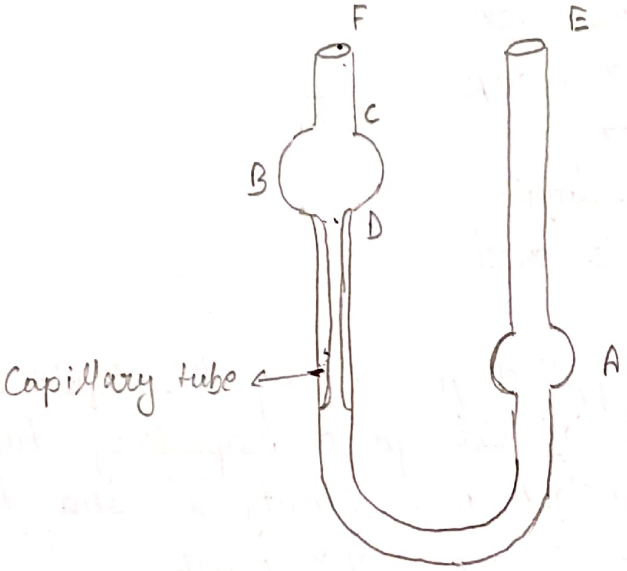

Ostwald viscometer

Date

Expt. No.

Page No.

Procedure :

1. First we have clean and dry all the apparatus.
2. Now we have put definite amount of liquid (water) through end E of the ostwald viscometer
3. We have sucking the liquid through F end upto mark C and close the end F by finger.
4. By removing finger, stopwatch is started to note the time of flow of liquid between C and D point.
5. Again we have taken specific gravity bottle and weighted in empty and by putting the liquid upto neck, we get the mass of liquid and volume is known so we caculate density, $d = m/v$.
6. This process is repeated for experimental liquid.
7. Finally we calculate the viscosity of experimental Liquid.

Observation table:

S. no.	time of flow, t_2 (water)	time of flow, t_1 (benzene)
1	62	50
2	61	49
3	60	50
Mean	61	49.67

Teacher's Signature

Date _____

Expt. No. _____ Page No. _____

Calculation :

weight of specific gravity bottle (empty) = 13.41 gm
weight of specific gravity bottle (with water) = 63.09 gm
weight of water = 49.68

weight of specific gravity bottle (empty) = 21.28 gm
weight of specific gravity bottle (with benzene) = 66.31 gm
weight of benzene = 45.03

d_1 (density of benzene) = 0.9006
d_2 (density of water) = 0.9936

$$\eta_1 = \frac{0.9006 \times 49.67 \times 0.0081}{0.9936 \times 61}$$

$$= 0.005978 \text{ poise}$$

$$= 5.978 \times 10^{-3} \text{ poise}$$

Result :

The theoretical value of viscocity coefficient of benzene at 26 °C = 5.978×10^{-3} poise

14/11/19

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