

Exp.3: Determination the Viscosity of Liquids

The viscosity of liquid is a resistance to flow of a liquid. All liquids appear resistance to flow change from liquid to another, the water faster flow than glycerin, subsequently the viscosity of water less than glycerin at same temperature. Viscosity occurs as a result of contact liquid layers with each other. The viscosity is measuring by Ostwald viscometer.

Relative Viscosity is the ratio of the absolute viscosity of the fluid on the viscosity of water at a certain temperature....

Viscosity equation:

$$\therefore \frac{\eta_1}{\eta_2} = \frac{t_1 d_1}{t_2 d_2}$$

η_1 is viscosity of liquid 1

η_2 is viscosity of liquid 2.

t_1 flow time of liquid 1.

t_2 flow time of liquid 2.

d_1 density of liquid 1.

d_2 density of liquid 2.

The factors effect on the viscosity:

1. Effect of Temperature: the temperature of the liquid fluid increases its viscosity decreases. In gases its opposite, the viscosity of the gases fluids increases as the temperature of the gas increases.
2. Molecular weight: the molecular weight of the liquid increases its viscosity increases.

3. Pressure: when increase the pressure on liquids, the viscosity increase because increase the attraction force between the molecules of liquid.

Chemicals and materials:

1- liquid 1

2- Liquid 2

3- Distilled water

4-Baker

5- Ostawld viscometer

6- Pipet

Procedure:

1. Clean the viscometer by the water and ethanol and dry it.
2. Put a certain amount of liquid in the large bulge viscometer and pull it by pipette until the small bulge is full.
3. Put viscometer vertically in the water bath at the desired temperature.
4. Let the liquid to flow through the capillary tube with run time when the liquid reaches the mark shown on the viscometer and then stopped time when the liquid reaches the bottom mark.
5. Repeat the experiment and record the results (take average of results).
6. Repeat the experiment to other liquids.
7. Change the temperature and calculate the viscosity.

Calculation: Calculate the viscosity by the relationships:

$$\frac{\eta_1}{\eta_2} = \frac{t_1 d_1}{t_2 d_2}$$

η_1 is viscosity of liquid 1.

η_2 is viscosity of water 0.891 poise.

t_1 flow time of liquid 1.

t_2 flow time of water.

d_1 density of liquid 1.

d_2 density of water 0.997 g/cm³ .

Can be calculate the Relative Viscosity by the relationships:

$$\eta_{\text{relative}} = \frac{\eta_1}{\eta_{\text{H}_2\text{O}}}$$