

* Factors affecting viscosity of liquids:-

(1). Effect of temperature on viscosity:-

The viscosity of a liquid generally decreases with rise in temperature. The decrease is appreciable, being about 2% per degree rise of temperature in many cases.

The relationship between coefficient of viscosity of a liquid and temperature is expressed mathematically as:

$$\eta = A e^{E_a/RT}$$

where, A and E_a are constants for a given liquid. E_a is called the activation energy for viscous flow.

(2). Effect of pressure on viscosity:-

The viscosity of liquids, however, increases with increase in pressure. This is attributed to decrease in the no. of holes as the pressure is increased. Consequently, it becomes more difficult for liquid molecules to move around and thus it becomes more difficult for them to flow.

* Reynolds Number :-

The flow of a liquid (fluid) through a pipe of radius 'r' has been associated with a number called Reynolds Number, and defined as:

$$NR = 2R\bar{v}\rho/\eta$$

Where, \bar{v} is the average bulk velocity of the fluid, ' ρ ' is the density and η is the coefficient of viscosity.

If NR is greater than 4000, the flow is turbulent and if it is less than 2100, the flow is laminar. In a laminar flow, a velocity profile is given by -

$$\bar{v} = \frac{\Delta P (R^2 - r^2)}{4\eta l}$$

Where, ' ΔP ' is pressure drop over a length 'l' and 'r' is the distance from the axis of the pipe of radius 'R'.

From,
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