

## Glossary

- When force acting on a surface of a fluid is perpendicular to it, the stress is called normal stress.
- When the force acts parallel to the surface of a fluid, the stress is called shear stress,  $\tau$ .
- The density of a liquid is defined as its mass per unit volume and is expressed as  $\text{kg/m}^3$  in the SI unit system. In a physical sense, the magnitude of the density is the mass of a quantity of a given liquid occupying a defined unit volume.
- Viscosity is a measure of resistance to flow of a fluid.
- Fluids that exhibit a linear increase in the shear stress with the rate of shear are called *Newtonian fluids*. Fluids which deviate from this linearity are called *non-Newtonian fluids*.
- Viscometers based on fluid flow through a cylinder are called capillary or tube viscometers, depending on the inside diameter. The principle of operation is based on the Poiseuille equation (derived from Eq. (1)), if the fluid is Newtonian.
- The Rabinowitsch- Mooney equation (derived from Eq. (2)) applies when the fluid is non-Newtonian.
- Poiseuille equation :  $\bar{u} = \frac{\Delta PR^2}{8\mu L}$
- Rabinowitsch- Mooney equation : 
$$\left. -\frac{dV}{dr} \right|_w = u \left[ \frac{3n+1}{n} \right] \left[ \frac{1}{R} \right]$$
- Types of viscometers:  
Capillary viscometer  
Rotational viscometer
- The temperature dependence of the viscosity and the consistency index can be expressed in terms of the Arrhenius equation:

$$\ln\left(\frac{\mu}{\mu_1}\right) = \frac{E_a}{R} \left( \frac{1}{T} - \frac{1}{T_1} \right)$$