

# Pressure

**Pressure** : Pressure is defined as force acting normally on unit area of the surface.

1. Pressure ( $P$ ) =  $F/A$  = Normal force on the surface / Area of the surface
2. SI unit of pressure is  $N / m^2$  also called pascal (Pa). Pressure is a scalar quantity.

## Atmospheric Pressure :

Atmospheric pressure is that pressure which is exerted by a mercury column of 76 cm length at  $0^\circ C$  at  $45^\circ$  latitude at the sea-level. It is equal to weight of 76 cm column of mercury of cross-sectional area  $1 \text{ cm}^2$ . Generally it is measured in bar.  
 $1 \text{ bar} = 10^5 \text{ N/m}^2$

Atmospheric pressure  $1 \text{ atm} = 1.01 \text{ bar} = 1.01 \times 10^5 \text{ N/m}^2 = 760 \text{ torr}$  One torr is the pressure exerted by a mercury column of 1 mm length.

1. Atmospheric pressure decreases with altitude (height from earth's surface). This is why (i) It is difficult to cook on the mountain (ii) The fountain pen of a passenger leaks in aeroplane at height.
2. Atmospheric pressure is measured by barometer. With the help of barometer, weather forecast can be made.
3. Sudden fall in barometric reading is the indication of storm.
4. Slow fall in barometric reading is the indication of rain.
5. Slow rise in the barometric reading is the indication of clear weather.

## Pressure in liquid :

Force exerted on unit area of wall or base of the container by the molecules of liquid is the pressure of liquid.

The pressure exerted by liquid at depth  $h$  below the surface of liquid is given as  $p = hdg$  where  $d$  is the density of liquid.

### 1. Regarding pressure, the following points are worth noting:

- (i) In a static liquid at same horizontal level, pressure is same at all points.

- (ii) Pressure at a point in a static liquid has same value in all directions
- (iii) Pressure at a point in a liquid is proportional to the depth of the point from the free surface.
- (iv) Pressure at a point in a liquid is proportional to the density of the liquid.

### **Pascal law for pressure of liquid**

- (i) If gravitational attraction is negligible, in equilibrium condition, pressure is same at all points in a liquid.
- (ii) If an external pressure is applied to an enclosed fluid, it is transmitted undiminished to every direction.

---> Hydraulic lift, hydraulic press, Hydraulic brake work on Pascal law.

### **Effect of pressure on Melting Point and Boiling Point**

- (i) The M.P. of substances which expands on fusion increases with the increase in pressure; for example - wax.
- (ii) The M.P. of substances which contracts on fusion decreases with the increase in temperature for example - ice.
- (iii) Boiling point of all the substances increases with the increase in pressure.