Density

It is defined as the mass per unit volume of the substance.

$$\text{Density } (\rho) = \text{mass/volume} = m/v \quad kg/m^3$$

Specific weight

It is defined by the weight possessed per unit volume of the substance.

$$\text{Specific weight } (N), \; N = \frac{\text{Weight}}{\text{Volume}} = \frac{W}{V} = N/m^3$$

Specific volume

It is defined as the volume occupied by unit mass of the substance.

$$\text{Specific volume } (v) = \frac{\text{Volume}}{\text{Mass}} = \frac{V}{m} = m^3/kg$$

Specific gravity

It is the ratio between the densities of the substance to the standard substance or specific weight of the given substance to the specific weight of the standard substance.

$$\text{Sp. gravity } (s) = \frac{\text{Density (or) Sp. weight of given substance}}{\text{Density (or) Sp. weight of standard substance}}$$

Liquid - water, air for gas.

Pressure

It is defined as the force per unit area

$$\text{pressure, } p = \frac{\text{force}}{\text{Area}} = F/A \quad N/m^2$$

1 pascal = $1 \; N/m^2$

1 Bar = $10^5 \; N/m^2 = 100 \; kN/m^2$

1 mm of water = $9.80665 \; N/m^2$

1 mm of mercury = $133.3 \; N/m^2$

Atmospheric pressure

The pressure exerted by the air on the atmosphere

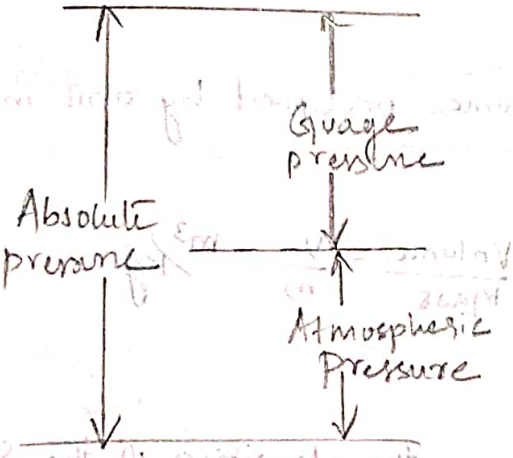
It value is 1.01325 bar

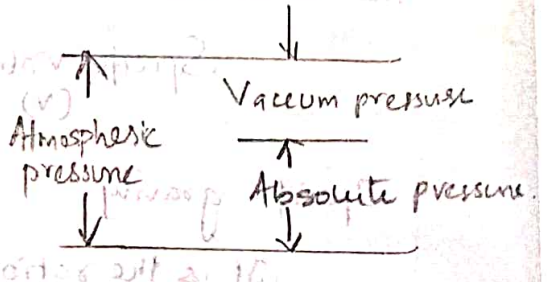
1.01325 bar = 101.325 KN/m^2 or kPa

= 101325 N/m^2 or Pa

= 760 mm of Hg

= 10.34 m of water.





Guage pressure

The pressure guage reads zero at atmospheric level. The actual measure of the difference of fluid pressure and atmospheric pressure is called guage pressure.

Vaccum pressure

The pressure below the atmospheric pressure is called as Vaccum pressure.

Absolute pressure

The pressure measured from Absolute zero pressure is called absolute pressure.

Absolute Pressure = Absolute Pressure + Guage pressure

also ∴ Absolute pressure = Atmospheric pressure − Vaccum pressure.

Temperature (T)

It is the property to determine the degree of hotness or coldness of a body.

Absolute Temperature.

Absolute Zero temperature is the Zero with below which the temperature of any substance exists. The value is $-273^{\circ}C$. The temperature measured from the absolute Zero temperature is called as absolute temperature.

	ice	Steam
Celsius scale	$0^{\circ}C$	$100^{\circ}C$
Fahrenhit Scale	$32^{\circ}F$	$212^{\circ}F$

$100^{\circ}C$		373K
$0^{\circ}C$		273K
$-273^{\circ}C$		0K

$T = t + 273$

Standard temperature and Pressure (STP)

Standard Temperature $= 15^{\circ}C$

Standard Pressure $= 760$ mm of Hg

$= 101.325\ KN/m^2$

Normal Temperature and pressure (NTP)

The condition of Temperature at $0^{\circ}C$ and 760mm of Hg is called as Normal temperature and pressure.

Specific heat Capacity.

The quantity of heat transfer required for raising the or lowering the temperature of unit mass of the substance through one Degree is called Specific heat Capacity

Unit is J/kg K or KJ/kg/K

Specific Heat Capacity at Constant Volume (C_v)

The quantity of heat transfer required for raising or lowering the temperature of unit mass of the substance through one degree when volume remains constant.

$$Q = m C_v (T_2 - T_1) \text{ kJ}$$

Specific heat capacity of Constant pressure (C_p)

It is defined as the "the quantity of heat transfer reequired to raise or lower the temperature of unit mass of the substance through one degree when pressure is kept constant.

$$Q = m c_p (T_2 - T_1)$$

for gases

C_p is always greater than C_v

Ratio of two specific heats $= \frac{C_p}{C_v} = \gamma$

$C_p = 1.005 \text{ kJ/kg K}$

$C_v = 0.718 \text{ kJ/kg K}$

$\gamma = 1.4.$