

PHYSICAL QUANTITIES AND MEASUREMENTS

1. Define the term Density of a substance?

Ans → The Density of a substance is defined as mass per unit volume of that substance.

2. State the SI and the CGS unit of density. How they are related?

Ans → The SI unit of density is  $\frac{kg}{m^3}$  or  $kg m^{-3}$

The CGS unit of density is  $\frac{g}{cm^3}$  or  $g cm^{-3}$ .

Relationship between  $kg m^{-3}$  and  $g cm^{-3}$

$1 kg = 1000 g$  or  $1 g = \frac{1}{1000} kg$

and  $1 m^3 = (100 cm)^3$   
 $= 100 \times 100 \times 100 cm^3$   
 $= 10,00,000 cm^3$

or

$1 cm^3 = \frac{1}{10,00,000} m^3$

Now  $1 g cm^{-3} = \frac{1 g}{1 cm^3}$   
 $= \frac{1}{1000} \frac{kg}{\frac{1}{10,00,000} m^3}$   
 $= \frac{10,00,000}{1000} kg m^{-3}$

$= 1,000 kg m^{-3}$

Thus,  $1 g cm^{-3} = 1,000 kg m^{-3}$

3. How does the density of water change when heated from 0 to 4 Degree celcius ?  
How will the density will change with temperature ?

Ans → Water contracts on heating from 0°C to 4°C and expands on heating above 4°C. The density of a substance (liquid) decrease with rise in temperature and vice versa.  
[Note: - Water between 0°C to 4°C does not obey the above relation]

4. The Mass of 5L Water is 5kg. Find the water in Gram Perc centimetre cube ?

Ans → Given,

$$\text{Mass (M)} = 5 \text{ kg} = 5000 \text{ g}$$

$$\text{Volume (V)} = 5 \text{ litre} = 5000 \text{ cm}^3$$

$$\text{Density of water } d = \frac{M}{V}$$

$$= \frac{5000 \text{ g}}{5000 \text{ cm}^3}$$

$$= 1 \text{ g cm}^{-3}$$