

(1) Define the term density of a substance?
The density of a substance is defined as the mass of a unit volume of that substance.

(2) State the SI and the CGS unit of it how they are related?

S.I. unit of density is kg m^{-3}

C.G.S. unit of density is g cm^{-3}

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

We know $1 \text{ kg} = 1000 \text{ g}$

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

$$\text{and } 1 \text{ m}^3 = (100 \text{ cm})^3$$

$$= 1000000 \text{ cm}^3$$

$$\text{or } 1 \text{ cm}^3 = \frac{1}{1000000} \text{ m}^3$$

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

$$= \frac{1}{1000} \text{ kg}$$

$$\frac{1}{1000000} \text{ m}^3$$

$$= 1000 \text{ kg m}^{-3}$$

$$\text{Thus, } 1 \text{ g cm}^{-3} = 1000 \text{ kg m}^{-3}$$

3. How does the density of water change when heated from 0°C to 4°C ?

The density of water increases when heated from 0°C to 4°C .

4. How density will change with temperature?

The density of water increases when heated from 0°C to 4°C and then decreases on heating above 4°C .

5. Mass $M = 5\text{kg} = 5000\text{g}$
Volume $V = 5\text{litre} = 5000\text{cm}^3$

$$\text{Density of water } d = \frac{M}{V} = \frac{5000\text{g}}{5000\text{cm}^3} \\ = 1\text{gcm}^{-3}$$