1. The density of alcohol is $600 \, kg/m^{-3}$. Express it in $g \, cm^{-3}$.

sol: $600 \, g/cm^3$

2. A piece of wood of mass $150 \, g$ has a volume of $200 \, cm^3$. Find the density of wood in (a) C·G·S unit, (b) S·I· unit.

sol: Mass of wood $= 150 \, g$
Volume of wood $= 200 \, cm^3$
Density $= m/v$
$D = 150/200$
$D = 0.75 \, g/cm^3$
(b) In SI system $= 0.75 \times 1000 = 750 \, kg/m^3$

3. Calculate the density of solid from the following data:

(a) Mass of solid (M) $= 72 \, g$
(b) Initial volume of water in measuring cylinder $= 24 \, ml$.
(c) Final volume of water when solid is completely immersed in water $= 42 \, ml$

sol: Mass of solid (M) $= 72 \, g$
Initial volume of water $V_1 = 24 \, ml$
Final volume of water $V_2 = 42 \, ml$
Volume of solid (V) $= V_2 - V_1 = 42 - 24 = 18 \, cm^3$
Density of solid (D) $=$
$D = \dfrac{M}{V} = \dfrac{72}{18} = 4 \cdot 08 \, cm^{-3}$

4. How does the density of a liquid (or gas) vary with temperature?

sol: As the temperature increases, volumes of most of the liquids also increases and when the volume increases, density decreases. Similarly, when temperature decreases, the volume of most liquids decreases which increases the density. However, water shows anomalous behaviour. Water has maximum volume at 4-degree Celsius and maximum density at 4-degree Celsius. But when the water is cooled down further, its volume starts increasing and hence, the density of water decreases when cooled further below than 4-degree Celsius. Hence, the density of water is maximum at 4-degree Celsius at $1 \, g \, cm^{-3}$ or $1000 \, kg \, m^{-3}$.

5. What is a density bottle? How is it used to find the density of a liquid?

Sol: Density bottle is a small glass bottle which has a glass stopper at its neck. The bottle can store a fixed volume of a liquid. Generally, the density bottle comes in two sizes, 25 ml or 50 ml. The glass stopper has a narrow hole in it. When the bottle is filled with liquid and a stopper is inserted, the excess the excess liquid rises through the hole and drains out. Thus, the
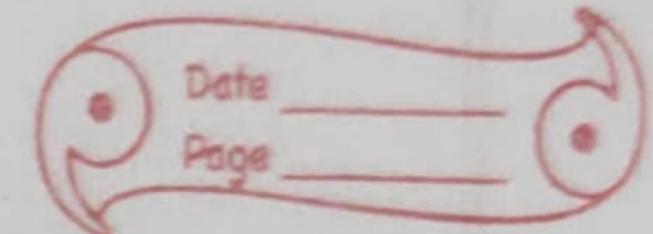
bottle will contain the same volume of liquid each time when it is filled. It is used to determine the density of a liquid.