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

sol: density of alcohol : $600 \, kg/m^{-3}$

express $1 \, kg/m^{-3} = 10^{-3} \, g/cm^{-3} = \dfrac{1}{1000} \, g/cm^{-3}$

$600 \, kg/m^{-3} = 600 \times \dfrac{1}{1000} \, g/cm^{-3}$

$\qquad\qquad\qquad = \dfrac{\overset{3}{\cancel{600}}}{\underset{5}{\cancel{1000}}} \, g/cm^{-3}$

$\qquad\qquad\qquad = \dfrac{3}{5} \, g/cm^{-3} = 0.5 \, g \, cm^{-3}$

$600 \, kg \, m^{-3} = 0.5 \, g \, cm^{-3}$

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

sol: mass = 150 g
volume = $200 \, cm^3$

$density = \dfrac{m}{V} = \dfrac{\overset{3}{\cancel{150}}}{\underset{4}{\cancel{200}}} = 0.75 \, g \, cm^{-3}$

a) CGS system = $0.75 \, g \, cm^{-3}$

b) S.I unit = $1 \, g \, cm^{-3} = 1000 \, kg \, m^{-3}$

$= 0.75 \, g/cm^{-3} = \dfrac{0.75}{1000} \, kg/m^{-3} = 0.00075 \, kg/m^{-3}$

③ Calculate the density of solid from the following data:

a) Mass of solid = 72 g
b) Initial volume of water = 24 ml
c) Final volume of water = 42 ml.

sol: Let the initial vol. be V_1 and final vol. be V_2.

then, $V_2 - V_1 = V$

V is the density of the solid.

$$= V_2 - V_1 = V$$
$$= 42 - 24 = 18.$$

Mass = 72 g
density = 18

density $= \dfrac{m}{V}$

$18 = \dfrac{72}{V}$

$V = \dfrac{72}{18} = 4 \ cm^3$

density $= 18 \ g/cm^{-3}$

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

sol: As the temperature increases, volume of liquid also increases and when volume increases then density decreases.

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

sol: Density bottles are mainly used to determine the density of liquids of moderate viscosity.

✱ When the bottle is filled with liquid and a stopper is inserted. 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.