ASSIGNMENT - 1

(B)(1) Define the term density of a substance.

Ans - The density of a substance is its mass per unit volume.

Density of a substance = $\frac{\text{Mass of the substance}}{\text{Volume of the substance}}$

$$d = \frac{M}{V}$$

2) Name the S.I. Unit of density. How is it related to g cm^{-3}?

Ans - S.I Unit of density is kg m^{-3} (kilogram per cubic metre). In the C.G.S system unit of mass is g & unit of volume is cm^3, so CGS unit of density is g cm^{-3} (gram per cubic centimetre)

$$1 \text{ kg } m^{-3} = \frac{1 \text{kg}}{1 m^3} = \frac{1000 \text{g}}{(100 \text{cm})^3} = \frac{1}{1000} \text{ g } cm^{-3}$$

Thus, $1 \text{ kg } m^{-3} = 10^{-3} \text{ g } cm^{-3}$

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

3. The density of brass is $8.4\ g\ cm^{-3}$. what do you mean by this statement?

Ans. One cubic centimetre volume of brass hass mass of 8.4g.

4. Arrang the following substances in oreder of their increasing density:
Iron, Cork, Brass, Water, Mercuery

Ans- Cork, water, Iron, Brass Mercuery

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

Ans- Most of the liquid increase in volume with increase in temperature, but water shows anomalous behaviour. Water has maximam volume at 4°c and maximam density at 4°c. Actually, when volume increase density decrease & when volume decrease the density increases. But water when cooled from a high temperature contract upto 4°c because volume decreases & expands when cooled further below 4°c & hence density of water increases when it is cooled upto 4° while decrease when cooled further below 4°c. In other words, the density of water is maximum at 4°c equal to $1\ g\ cm^{-3}$ or $1000\ kgm^{-3}$.

6) A given quantity of a liquid is heated. which of the following quantity will vary & how?
a) mass (b) volume or (c) density

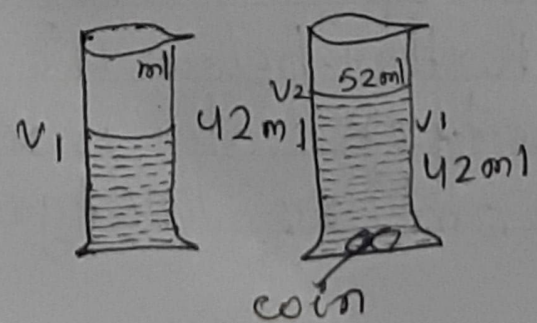
Ans - when a given quantity of liquid is heated
a) Mass : does not change
b) Volume: changes & increases with rise in temperature.
c) Density : changes & decreases
Density = Mass / Volume

Q. 7) Describe an experiment to determine the density of the material of a coin.

Ans - Density = $\frac{\text{Mass}}{\text{Volume}}$

To find the density of the material of a coin, we need to find its (i) mass - by common beam balance & (ii) its volume by measuring cylinder.

Measure the mass of coin :-
Let the mass of coin shown by beam balance = M (gram) = 50g (say)
Measure the volume of coin.
Initial volume of water = V_1 = 40 ml (say)
Final Volume of water =
when coin is added in the cylinder = V_2 = 50 ml (say)
Then, volume of coin = $V_2 - V_1$ = 50 - 40 = 10 ml
Density of material coin = $D = \frac{M}{V} = \frac{50}{52-42} = \frac{50}{10}$
= 5 g cm^{-3}



Q.8. Describe an experiment to determine the density of a liquid.

Ans - To determine the density of a liquid $D = M/V$
We need to find -
i) The volume of liquid say milk
ii) mass of liquid.

Experiment:

i) To find the mass of milk:
Wt. of empty 100 c.c beaker $= M_1 g = 70g$
Fill the beaker (half) with milk & Weigh again
$= M_2 g = 116g$

ii) To find the volume of milk:
Transfer this milk into measuring cylinder & note the volume $V = 40$ cc

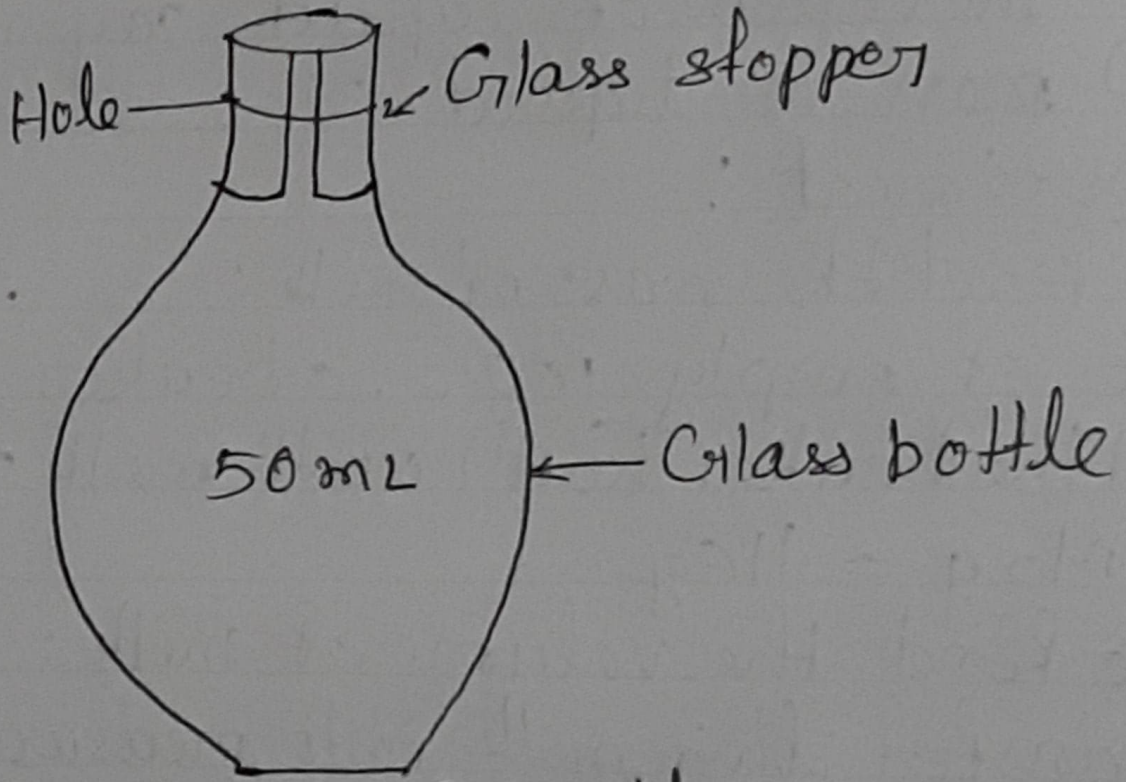
$\therefore$ Density of milk $= D = \frac{M}{V} = \frac{(M_2 - M_1)}{40 c.c}$

$= \frac{(116 - 70)}{40} = \frac{46}{40} = \frac{4.6}{4} = 1.15 \, g \, cm^{-2}$

Q.9. What is a density bottle? How is it used to find the density of a liquid?

Ans - Density of bottle is a small glass bottle having a glass-stopper at its neck. The bottle can store a fixed volume of a liquid. Generally the volume of bottle is 25 ml or 50 ml. The stopper has a narrow hole through

it. When the bottle is filled with the liquid & stopper is inserted, the excess liquid rises through the hole & drains out. Thus, the bottle always contains the same volume of liquid each time when it is filled. It is used to determine the density of a liquid.



Density of bottle