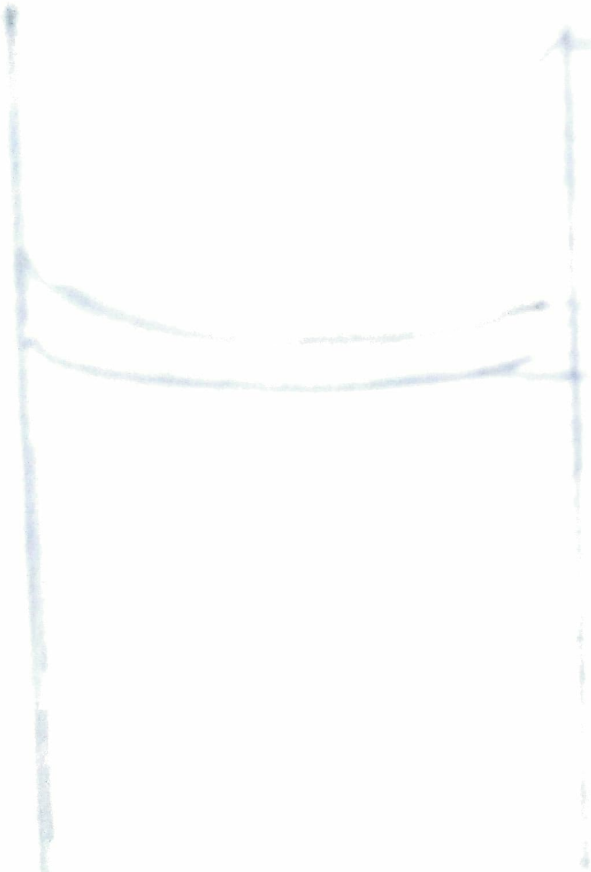

1) Density is mass per unit volume of a substance

2) The S.I unit of density is $kg\,m^{-3}$. $1\ gm\,cm^{-3} = 1000\ kg\,m^{-3}$

3) By the statement 'density of brass is $8.4\ gm\,cm^{-3}$' we mean that there is 8.4 gm of mass in each cm^3 area of brass.

4) cont
water → water → iron → brass → mercury
$(0.25\ gm\,cm^{-3})$ $(1\ gm\,cm^{-3})$ $(7.8\ gm\,cm^{-3})$ $(8.4\ gm\,cm^{-3})$ $(13.6\ gm\,cm^{-3})$

5) The density of a substance decreases with increase in temperature, as the intermolecular space between it's molecules increases.

6) The density of the liquid can vary; it can decrease if the inter-molecular space between it's molecules increases.

7) Aim - To determine the density of a coin.

Materials required - a coin, a measuring cylinder, a thread

procedure - A coin was lowered slowly by a thread into a measuring cylinder keeping in mind that no water splashes out. Let the initial reading be W_1 and final reading be W_2

Observation - The density of the coin will be $W_2 - W_1 = W_3$.

8 Aim - To determine density of a liquid

Materials required - Density bottle, water, liquid, beam balance

Procedure - The density bottle is weighed on the beam balance. The value is noted. The bottle with water is also weighed and it's weight is noted along with bottle with liquid weight is weighed. The

observation - The ~~weight~~ mass of the water alone becomes the volume of the density bottle. The mass of the liquid is used to get density of the liquid

9,10 Relative density of a substance is the ratio of density of a substance with the density of water.

11 Relative density has no unit.

12	Density	Relative density
.	It is $\frac{\text{mass}}{\text{volume}}$ of a substance	It is the ratio of density of substance and density of water.
.	Units: gcm^{-3}, kgm^{-3}	It has no unit.

13 The ratio of density of aluminium and that of water is 2.7

14 If density of a body is greater than a liquid's density it will sink in that liquid and if it is is less than it will float in that liquid.

15 A cork floats on water because its density is less than water's ($<0.25 g/cm^3$) and an iron nail's density is greater than water.

16 Sink - b) and c) Float - a) and d)

17 The law of flotation states that any object that displaces the same or more weight of liquid than it's own, only then it floats

18 a) A piece of iron will sink in water

b) The piece of iron will float in mercury.

19

a) All of them experience the same amount of buoyant force

b) Liquid A < Liquid C

20 The weight of a floating body is balanced by the buoyant force, hence, it's apparent weight becomes zero.

21 A piece of wood floats on water because it's density is less than that of water.

22 An iron needle sinks in water as it's density is more than water and it displaces less weight of water than it's own weight whereas a ship made of iron has empty decks at it's bottom which makes it's overall density less than sea water and also displaces weight of water equal to it's weight.

23 It is easier to swim in sea water as it's density is higher and has greater potential of letting any object float on it eg: man. But river water is not saline and hence it is difficult to swim in it.

24 Icebergs that float on sea water have $\frac{1}{10}$ portion above water and it's large portion $\frac{9}{10}$ portion under water which are immensely huge and remain hidden under water and so can cause shipwrecks.

25 It is easier to lift a stone under water as it's weight gets reduced under water due to the buoyant force acting on it and making it's apparent weight less than actual weight.

26 A submarine is an underwater and above water travelling vehicle which can be made to dive in water by filling in it's water tanks with water and making the whole machines overall density more than water. It can be made to rise to the surface by emptying its water tanks and making it's overall density less than water.

6 Mass of the piece of wood = 150g , volume = 200 cm³

a) CGS unit = $g\,cm^{-3}$ b) SI unit = $kg\,m^{-3}$

$D = \frac{M}{V} \Rightarrow \frac{150}{200} = \frac{3}{4} = 0.75\,g\,cm^{-3}$ $D = \frac{M}{V} = \frac{150}{200} \times 1000 = 750\,kg\,m^{-3}$

7 mass of wood = 6000 kg , volume = ? , density = $0.8\,g\,cm^{-3}$

6000 kg = 6000000 g

Volume =

8 a) mass = 72g b) initial volume of water (w_1) = 24 ml, Final volume of water (w_2) = 42 ml

$D = \frac{M}{V}$ V in this case = $w_2 - w_1$

$\Rightarrow \frac{72g}{42-24\,cm^3} = \frac{72g}{18\,cm^3} = 4\,g\,cm^{-3}$ [1 ml = 1 cm³]

9 a) empty bottle's mass = 21.8g , mass of bottle with water = 41.8g , mass of bottle with liquid = 40.6g

water's mass = 41.8g − 21.8g = 20g , so volume of density bottle = 20 ml

D of liquid = $\frac{18.8}{20}$ = ~~3.76~~ 0.94 $g\,cm^{-3}$

b) $R.D = \frac{D \text{ of liquid}}{D \text{ of water}} = \frac{0.94\,g\,cm^{-3}}{1\,g\,cm^{-3}} = 0.94\,g\,cm^{-3}$

10

a) $D = \frac{M}{V}$ M = 54 − 22 = 32g V = 50 − 22 = 28 ml

$D = \frac{32g}{28\,cm^{-3}} = \frac{8}{7} = 1.14\,g\,cm^{-3}$

b) R.D = 1.14

11

a) Volume of density bottle = $75g - 30g = 45\ ml$

b) density of liquid = $\frac{m}{v} = \frac{65-30}{45} = \frac{35}{45} = \frac{7}{9} = 0.77\ gram^{-3}$

c) 0.77