Ch-2

A. T/F

a) Equal Volumes of two different substances have equal masses. F

b) The density of a piece of brass wire changes by changing its size or shape. F

c) The density of a liquid decreases with in its temperature. T

d) Relative density of water is 1.0. T

e) Relative density of a substance is expressed in $g\ cm^{-3}$ F

f) When a body is immersed in a liquid, the buoyant force experienced by the body is equal to the volume of the liquid displaced by it. F

g) A body experiences the same buoyant force while floating in water or alcohol. T

h) A body experiences the same buoyant force when it floats or sinks in water. F

I) A body floats in a liquid when its weight becomes equal to the weight of the liquid displaced

by its submerged. T

i) A body while floating, sinks deeper in a liquid of low density than in a liquid of high density. T

2. Fill in the blanks.

a) 1 kg is the mass of 1000 ml of water at 4°C.

b) mass = density x volume

c) The S.I unit of density is kgm^{-3}

d) density of water is 1000 kg m^{-3}

e) 1 g cm^{-3} = 1000 kgm^{-3}

f) The density of a body which sinks in water is more than 1000kgm^{-3}

g) A body sinks in a liquid A. but floats in a liquid B. The density of liquid A ~~is than need~~ less than the density of liquid B.

h) A body x sinks in water. but a but y Floats on water. The density of the body x is more than the density of body y.

i) The buoyant force experienced by a body when floating in

weight is equal to that when floating in pure water.

i) The weight of a body floating in a liquid is zero.

3) Column A

(a) $kg\ m^{-3}$
(b) no unit
(c) Relative density
(d) iron
(e) wood

Column B

i) relative density
ii) sinks in alcohol
iii) floats on water
iv) density
v) density bottle

4) m.c.q

a) The correct relation is :

ii) mass = Density x volume

b) The relative density of alcohol is 0.8 its density is

ii) 75 g

c) A block of wood of density 0.8 g/cm³ has a volume of 60 m^3. The mass of block is

iii) 48 g

d) The density of aluminium is 2.7 g cm^{-3} and that of brass 8.49 cm^{-3}.

The correct statement is :

ii) The mass of a certain volume of brass is more than the mass of equal volume of aluminium.

e) A density bottle has a marking 25 ml. on it. it means that.

ii) The density bottle will store 25 ml. of any liquid in it.

f) The correct statement is :

iii. The buoyant force on a body is equal to the weight of the liquid displaced by it.

g) A piece of wood floats on water. The buoyant force on wood will be.

iii) more than the weight of the wood piece.

h) The weight of a body is more than the buoyant force experienced by it, due to a liquid The body will :

i) sink

Short / Long Answer question.

i) Define the term density of a substance.

A-> The desity of a substance means that a body which when it density increases volume decrease es.

2-> Name the S.I unit of density. How is it related to gcm^{-3}?

A-> SI unit of density is kg/m^{-3} It is g/cm^3 Because it is biggeer of g/cm^3 is kg/m^3

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

A-> The statement The density of a brass is $8.4 g\ cm^{-3}$ because it is a density of a substance.

4-> Arrange the following substances in order of their increasing density.

A-> Mercury, ~~Water~~ Brass, Cork, Iron, water.

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

A-> It is always with temperature due the density of liquid and low density of a gas.

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

A-> The density ~~or~~ and the mass will decrease and the volume will increase.

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

A-> $D = \frac{M}{V}$

To find the density of a material of a coin, we need to find its mass by common beam balance.

and its volume by measuring cylinder

To measure the volume of coin.

Intial volume of water

$V_1 = 42ml$

Final volume of water when a coin is added in the cylinder $V_2 = 52ml$

The the volume of coin $= V_2 - V_1 = 52 - 42 = 10ml$

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

A) ~~To find~~ We need to find the volume of milk weight of empty 100 cc

beaker = $M_1 g = 70g$

Fill the beaker with milk into measuring cylinder again = $M_2 g = 196g$

To find to volume of Milk

Transfer the milk into measuring cylinder and note the volume = 40 c.c

$$D = D = \frac{M}{V} = \frac{M_2 - M_1}{40 c.c} = \frac{116-70}{40}$$

$$\frac{46}{40} = \frac{4.6}{4} = 1.15 \ g\,cm^3$$

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

A→ Density bottle is a small glass bottle which has glass stopper at its head.

The bottle can store a fixed volume of a liquid. Generally the density bottle comes in two sizes. 25ml & 50ml. The glass stopper has a narrow hole in it. 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. It is used to determine the density of a liquid

10) Define the term relative density of a substance.

A) Relative density is the ration of density of a substance to the density of water at 4 d.c.

11) What is the unit of relative density?

A) the unit of relative kg/m^3

12) Distinguish between density and relative density.

A) Density of a substance is according to mass and volume.

R.D. of a substance is relating of a mass and a volume.

13) Explain the meaning of the statement Relative density of aluminium is 2.7

A) the relative density of aluminium is 2.7 because the density is 27 g and volume of the liquid is 10 cm^3 = $\frac{m}{V}$

$= \frac{27}{10} = 2.7 g/cm^{-3}$

14) How does the density of a body and that of a liquid determine whether the body will float or sink into that liquid.

A) The density of body will float or sink in to the body because of Iron nail will sink in ocean but a big ship not

sink due to the density of a substance.

15) A cork piece floats on water surface while an iron nail sinks in it. Explain the reason.

A) The cork piece mass is very low and its density is also less so it will float but a iron nail will sink in water due to density and mass is high so it will sink.

16) Which of the following will sink or float on water? (Density of water = 1 g cm^{-3})

(a) body A having density 500 kg m^{-3}

b) Body B having density 2520 kg m^{-3}

c) Body C having density 1100 kg m^{-3}

d) Body D having density 0.58 g cm^{3}

A) Body B and Body C will sink

Body A and Body D will Flo

1 ⇒ State the law of floatation.

A ⇒ When a body floats in a liqui
the weight of the liquid
displaced by its immersed
part is equal to the tota
to the total weight body is
known as law of flotation.

18 ⇒ The density of water is 1.0
cm^{-3}. The density of iron is
7.8 $g\,cm^{-3}$. The density of mercu
is 13.6 $g\,cm^{-3}$. Answer the following
a ⇒ will a piece of iron floation
or sink in water?
b ⇒ will a piece of iron float or
sink in mercury.

A ⇒ a) Yes the iron will sink
in water

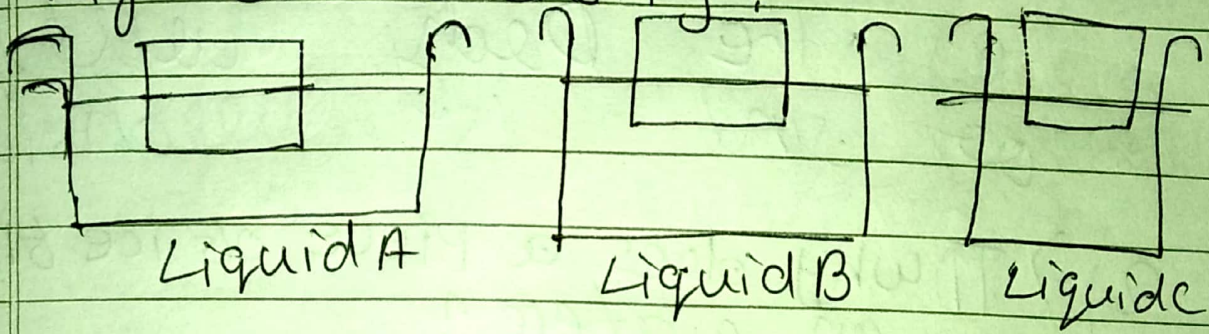
b) Yes the iron will float
on Mercury.

Q) The diagram given below shows a body floating in three different liquids. A, B and C at different levels.

a) In which liquid does the body experience the greatest buoyant force?

b) which liquid has the least density?

c) which liquid has the highest density?



A-> a) ~~Same~~ The boyuancy force will be same in each.

b) Liquid A will have the least density.

c) Liquid C will have the highest density

20) For a floating body. how is its weight related to the buoyant force?

A) The mass is related to the bouyant force because Due to mass density increases and volume decreases. The body will float or sink is considered

21) Why does a piece of ice float on water?

A) The Ice is a solid and its density is less than water and it can float easily in water.

22) Explain why an iron needle sinks in water, but a ship made of iron floats on water.

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A) Iron needle sinks in water because of its high density and mass. It will sink in water because of its greater density than water.

Where as in ship, which is made of iron have empty rooms containing air in it. So there is engine and the fuel which has a speed mover which moves and make the ship faster

2) it is easier to swim in sea water than in river water / Explain the reason.

A) It is easier to swim in water than river because in sea our mass and density becomes less where as in river our density becomes greater and also sink so it is possible that we may sink in water.

24) Icebergs floating on sea are dangerous for ships.. Explain the reason.

A) Icebergs are dangerous for ships floating because very few part is float under water it is very huge for which when a iceberg floats in water it hit to ship and ship sinks in water
e.g. → Titanic, olympic

25) Explain why it is easier to lift a stone under water than in air.

A) Stone is easier to lift in water because the mass and, volume and density gets decreases and it becomes easy to throw and lift it easily

in water.

26→ What is a submarine? How can it be made to dive in water and come to the surface of water?

A→ ~~Sub~~ Submerine can be made to dive or to rise to the surface of water. As and when desired. The reason is that asubrine is a water-tight boat which can travel under water like a ship and it contains water tank when filled with water it sinks

27→ A balloon filled with hydrogen rises in air. Explain the reason.

A→ A hydrogen filled ballon rises because the density of these gas

is less than the air. So, the buoyant force is exerted by the ballon due to air becomes greater than the weight rises up. Under the influence of the net upward force.

Numericals

1⇒ The density of air is 1.28 g litre^{-1}. Express it in

(a) g cm^{-3}. (b) kg m^{-3}.

A⇒ The density of air is:

1.28 g/liter^{-1}

a) It is g/cm^{-3} = 1.28/1000 = 0.00128 g/cm^{-3}

b) 1.28 g/liter = 1.28/1000 = 1.28 kg/m^{-3}

2) The dimensions of a hall are 10m x 7m x 5m. if the density of air is 1.11 kg m^{-3}. Find the mass of air in the hall.

A) Air dimensions of a hal = $10 \times 7 \times 5 = 350 m^3$

Density of air = 1.11 kg/m^3

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

$M = D \times V$

$M = 350 \times 1.11 kg/m^3$

$= 388.5 kg$

3) The density of aluminium is 2.7 g cm^{-3}. Express it in kg m^{-3}.

A) Density of aluminium = 2.7 g/cm^3

In kg/m^3 = $27 \times 1000 \times 10$

$= 27 \times 100 = 2700 kg/m^3$

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

A→Density of Alchohal = 600kg/

In g/cm^3 = 600/1000

= 0.60 g/cm^3

5→ A piece of zinc of mass 438.6 has a volume of 86 cm^3. calcul the density of zinc.

A→Mass of zinc = 438.6g

Volume = 86 cm^3

D = ?

D = M/V

D = 438.6/86

D = 5.1 g/cm^3

M = 150g

6⇒ A piece of wood of mass 150g has a volume of 200cm^3. Find the density of wood in:

(a) C.G.S unit.

(b) S.I unit.

Ans⇒ $M = 150g$

$V = 200cm^3$

$D = M/V$

$D = 150^3/200_4$

$D = \frac{3 \times 25}{4 \times 25} = \frac{75}{100}$

$D = 0.75\ g/cm^3$

b⇒ In SI system $= 0.75 \times 1000$
$= 750\ kg/m^3$

7⇒ Calculate the volume of

wood of mass 6000kg if the density of wood is $0.8 g cm^{-3}$

A-> V of wood = ?

M of wood = 6000 kg

D of wood = $0.8 g/cm^3 = 0.8 \times 1000$

$= 800 kg/m^3$

$D = M/V$

So, $V = M/D = 6000/800 = 7.5 m^3$

$V = 7.5 m^3$

8-) calculate the density of a solid from the following data.

a-> mass of solid = 72g.

b-> Initial volume of water in measuring cylinder = 24 ml.

c-> Final volume of water when solid is completely immersed in water = 42ml.

A-> Mass of solid = 72g

Initial volume $V_1 = 24ml$

Final volume $V_2 = 42ml$

Volume of solid $= V_2 - V_1 = 42 - 24 = 18 cm^3$

$D = \frac{M}{V} = \frac{72}{18} = 4.0\ g/cm^3$

9) The mass of an empty density bottle is 21.8g when filled completely with water it is 41.8g and when filled completely with liquid it is 40.6g. Find.

(a) the volume of density bottle.

(b) the relative density of liquid.

A) Density of water $= 1\ g\ cm^3$

a) Volume of empty density bottle

Mass of empty density bottle
$M1 = 21.8$

Mass of bottle + water
$M2 - M1 = 41.8 - 21.8 = 20g$

1g of water has volume =
$20\ cc = 20\ ml$

b) The Relative density of Liqu-

Mass of 20cc of liquid

Mass of density bottle

$= 40.6 - 21.8$

$= 18.8\ g$

Mass of 20cc of water = 20g

Relative density of liquid

$R.D. = \frac{\text{m of liquid}}{\text{m of solid}} = \frac{18.8}{20}$

$= 0.94$

10-> From the following observeting. calculate the density and relative density of a brine Solution. mass of empty density bottle = 22g

mass of bottle + water = 50g

mass of bottle + brine solution = 54g.

A) $M_1 = 22g$

$M_2 = 50g$

$M_3 = 54g$

Mass of water $= 50 - 22 = 28$

Mass of bottle $M_1 = 22g$

Mass of brine solution $=$
$M_3 - M_1 = 54 - 22 = 32\ g.$

D of brine solution $=$
$\frac{\text{Mass of brine}}{\text{Mass of water}}$
$\frac{32}{28} = 1.14\ g/cm^3$

11) The mass of an empty density bottle is 30g, it is 75g when filled completely with water and 65g. when filled completely with a liquid find.
a) volume of density bottle.
b) density of liquid and

c) relative density of liq

A) Mass of empty density
Bottle = M1 = 30g
Mass of bottle + water M2 =
75g
Mass of liquid + bottle = M3 =
Mass of water = M2 - M1
75 - 30 = 45g

a) Volume of density bottle
= Mass of water = 45g

b) Density of a liquid x =

$$\frac{\text{Mass of liquid}}{\text{Mass of water}} = \frac{35}{45} = 0.77$$

Mass of liquid = M3 - M1 = 65
= 35g

c) M of water = 75-30 = 45g

M of equal ~~volume~~ volume of solid is ~~of~~ density bottle = 85-30g

$$\frac{\text{Mass of liquid}}{\text{Mass of water}} = \frac{35}{45} = \frac{7}{9}$$

$$= 0.77$$