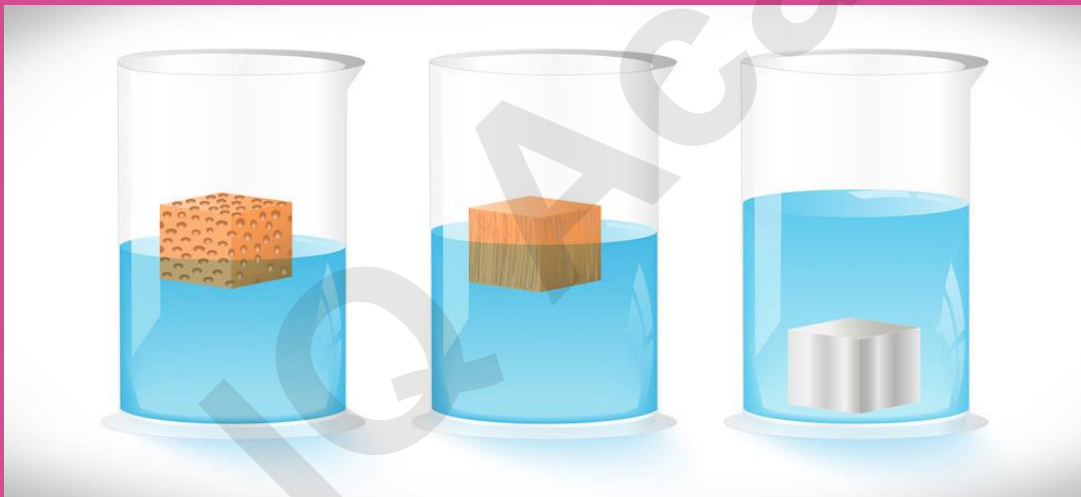


2

Calculation of Density, Mass, Volume

In this chapter we will be learning

2.1 Calculation of Density Mass, Volume



*The human head are
the same density as
water melon !!!*



2.1

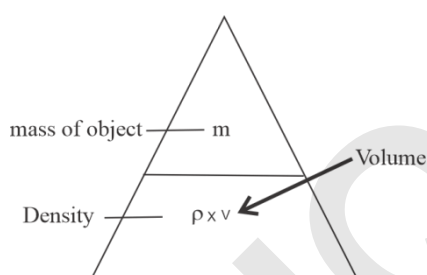
Calculation of Density, Mass, Volume

Density is a measure of how compact the mass in a substance or object is.

Density indicates how much of a substance occupies a specific volume at a defined temperature and pressure.

The density of an object or substance can be calculated from this equation density in kilograms per meter cubed is equal to mass in kilograms. Divided by volume in metres cubed or in other words we can say that density is mass spread out over a volume. So, density is mass per unit volume.

$$\text{i.e. Density} = \frac{\text{Mass}}{\text{Volume}}$$
$$\text{or } \rho = \frac{m}{v}$$



where ρ is the density, m is the mass and v is the volume.

Units of Density

The S.I. unit of mass is Kg and that of volume is m^3 .

$$d = \frac{Kg}{m^3}$$

The S.I. unit of density is $Kg\ m^{-3}$

Other Density Units

- ❖ Gram per millilitre (g/ml)
- ❖ Kilogram per litre (kg/L)
- ❖ Kilogram per cubic decimetre (kg/dm^3)

1. Separation of oil from Water. Leakage of oil tank in the ocean then oil drops start to float on the water due to less density in the water.
2. Dense material includes iron, lead or platinum. Dense material is more likely to feel heavy or hard?
3. Calculate the density of water if it has a mass of 1160 kg and a volume of $1m^3$?

Given

Mass = 1160 kg.

Volume = 1 m

Density is given by the formula:

Density = Mass / Volume

$$\rho = 1160 / 1$$

$$= 1160\ Kg/m^3$$

4. The Volume of an object is $8cm^3$ and mass of an object is 84 gm. What is Density of the object?

We have,

$$\text{Volume (v)} = 8\ cm^3$$

$$\text{Mass (m)} = 84\ gm$$

$$\rho = \frac{m}{v}$$

$$\rho = \frac{84\ gm}{8\ cm^3}$$

$$= 10.5\ \frac{gm}{cm^3}$$

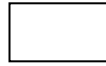
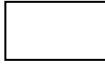
$$\therefore \text{Density} = 10.5\ gm\ cm^{-3}$$

Calculation of Density, Mass, Volume

2.1

WORK SHEET 2.1

1. Take two boxes that have the same volume. Fill the first box with x balls and second box with $6x$ balls. If the mass of each ball is the same, which box would weight more?



2. If you find a shiny rock, a carbon allotrope with a volume of 0.042 cm^3 and mass of 0.14 g . is it graphite or Diamond? The density of graphite is 2.266 g/cm^3 and density of diamond is 3.51 g/cm^3 .

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3. An Object has a mass of 570 g and volume of 2280 cm^3 . Calculate its density.

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4. A Ball has volume 0.004 m^3 and density 980 kg/m^3 . Calculate the mass of the Ball.

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5. The density of a substance is defined as the mass per unit volume of that substance

(a) True (b) False

6. is the characteristic property of a substance.

(a) Density (b) Velocity (c) Temperature (d) Displacement

7. A fresh egg sinks in pure water. Whereas it floats in salty water.

(a) This is because salt water is denser than pure water.

(b) The egg is less dense than pure water.

(c) Salt water is less dense than an egg.

(d) Salt water is denser than the egg.

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8. Find out the density of a cube of sugar which weighs 12 grams and measure 2 cm on a side?

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Answer key

WORKSHEET 2.1

1. Box that has more balls has more mass per unit of volume, the second box would weigh more.
2. For graphite $\rho = m/v$
 $m = \rho v$
 $m = 2.266g/cm^3 \times 0.042 cm^3$
 $= 0.0951 g$
For Diamond $m = \frac{3.51g}{cm^3} \times 0.042cm^3$
 $= 0.1474g$
3. Density = $0.25g/cm^3$
4. Mass = $3.92kg$
5. True
6. (a) Density
7. (d) salt water is denser than the egg
8. The sugar cube has a density of $1.5 gm/cm^3$