HW
19.07.21

Physics

HOME ASSIGNMENT.

1. The density of alcohol is 600 kg/m^3. Express it in gcm^{-3}.

Given,

Density of alcohol in kg m^{-3} = 600 kg/m^3

Density in gcm^{-3} =

$1 m^3 = 100 cm$

$1 m^3 = 100 cm \times 100 cm \times 100 cm$

$= 10^6 cm^3$

$1 kg = 1000 g$

$600 kg = (600 \times 1000) g$

$= 6 \times 10^5 g$

Now,

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} = \frac{6 \times 10^5 g}{10^6 cm^3}$$

$$= \frac{6 g}{10 cm^3}$$

$$= 0.6 g cm^{-3}$$

∴ Hence, its density is $0.6 g cm^{-3}$ in $g cm^{-3}$.

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

(a) C.G.S. unit.

Given,

Mass of the piece of wood = 150 g

Volume of the piece of wood = 200 cm^3

Density in C.G.S. unit =

Now, Dens

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

$= \frac{150\,g}{200\,cm^3} = 0.75\,g\,cm^{-3}$

∴ Hence, the density of wood in C.G.S. unit is $0.75\,g\,cm^{-3}$.

(b) S.I.

Given,

Mass of the piece of wood = 150 g

Volume of the piece of wood = 200 cm^3

Density of the piece of wood in S.I. unit =

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

$= 1\,g = \frac{1}{1000}\,kg$ $= 150\,g = \left[\frac{150 \times 1}{1000}\right] kg$

$= 15/100\,kg$

$= 1\,cm = \frac{1}{100}\,m$

$= 1\,cm^3 = \frac{1\,m}{100} \times \frac{1\,m}{100} \times \frac{1}{100}\,m = \frac{1}{10^6}\,m^3$

Now,

$= \frac{0.15\,kg}{10^6\,cm^3}$ $= \frac{15\,kg}{10^8\,m^3}$ $= 0.$

$= 1\,g = \frac{1}{1000}\,kg$

$= 150\,g = \left[150 \times \frac{1}{1000}\right] kg$

$= \frac{15}{100}\,kg$

$1\,cm = \frac{1}{100}\,m$

$1\,cm^3 = \frac{1}{100}\,m \times \frac{1}{100}\,m \times \frac{1}{100}\,m$

$= \frac{1}{10^6}\,m^3$

$200\,cm^3 = 200 \times \frac{1}{10^6}\,m^3 = \frac{2}{10^4}\,m^3$

Now,

$\frac{\text{Mass}}{\text{Volume}} = \frac{15 \times 10^{-2}}{2 \times 10^{-4}}\,\frac{kg}{m^3} = \frac{750\,kg}{m^3} = 750\,kg\,m^{-3}$

∴ Hence, the density of the wood in S.I. unit is $750\,kg\,m^{-3}$.

3. Calculate the density of solid from the following data:

(a) Mass of solid (M) = 72 g

(b) Initial volume of water in measuring cylinder = 24 ml

(c) Final volume of water when solid is completely immersed in water 42 ml.

Given,

Mass of the solid = 72 g

Volume of water = 24 ml.

Volume of water including solid = 42 ml

Amount of water displaced = (42 - 24) ml

= 18 ml

As we know,

$= 1\ ml = 1\ cm^3$

$= 18\ ml = 18\ cm^3$

And,

* Amount of water displaced when a solid is completely immersed into it, defines the volume occupied in the water.

So,

Water displaced = Volume of solid.

Volume of the solid = $18\ cm^3$

Density of the solid = $\frac{M}{V} = \frac{72g}{18cm^3} = \frac{4g}{cm^3}$

$= 4g\ cm^{-3}$.

∴ Hence, the density of solid is $4g\ cm^{-3}$.

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

When we provide temperature (kinetic energy) to any liquid or gas, the intermolecular distance between their molecules increases and vice versa.

So, here, the volume get increased or decreased may result in the change in their density.

Hence, concluded that ~~different~~ substances of equal volumes ~~has~~ have different masses, whereas substances of equal masses have different volumes.

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

A density bottle is a specially designed bottle which is used to determine the density of a liquid.

There is stopper provided at the top, which has narrow hole through it. When the bottle is filled with the liquid and stopper is inserted, the excess liquid rises through the hole and drains out. Thus, the bottle always contains the same volume of liquid each time when it is filled.