H/W

22/07/2024

1. The mass of a density bottle is 35g when empty, 65g when filled with water, and 59g when filled with alcohol. Find the relative density of alcohol.

Sol.

Mass of density bottle $M_1 = 35g$

Mass of density bottle + water $M_2 = 65g$

Mass of density bottle + alcohol $M_3 = 59g$

$$\text{Relative density of alcohol} = \frac{\text{Mass of alcohol}}{\text{Mass of equal volume of water}}$$

$$\frac{M_3 - M_1}{M_2 - M_1} = \frac{59 - 35}{65 - 35} = \frac{24}{30} = 0.8 \, g$$

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

A. A density bottle is a small glass bottle having a glass stopper at its neck. The bottle can store a fixed vol. of a liquid. The stopper has a narrow hole through it.

When the bottle is filled with the liquid and the stopper is inserted excess water rises through the hole and drains out.

3. Distinguish between density and relative density.

A.	DENSITY	RELATIVE DENSITY
	* The density of a substance is it's mass per unit volume	* The ratio of the mass of any vol. of the substance to the mass of an equal vol. of water
	* Density = $\dfrac{Mass}{volume}$	* $R \cdot D = \dfrac{Density \ of \ substance}{Density \ of \ water}$
	* It's S.I unit is $kg \ m^{-3}$	* It has no S.I. unit.

4. Explain the meaning of the statement "Relative density of aluminium is 2.7".

A- The statement "Relative density of aluminium is 2.7 refers to a piece of aluminium of a given vol. has a mass 2.7 times that of an equal vol. of water.

5. 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 40.6 g. Find

a) The vol. of density bottle

Mass of empty density bottle = M_1 = 21.8g

Mass of bottle + water = M_2 = 41.8g

∴ Mass of water completely filing the density bottle = $M_2 - M_1$

= 41.8 − 21.8 = 20g = 20 cm³

density of water = 1 g/cm³

Density = Mass/vol. ∴ V = 20.

The relative density of liquid.

Mass of density bottle $= M_1 = 21.8g$

Mass of density bottle + liquid $= M_3 = 40.6g$

Mass of 20 cm³ of liquid $= 40.6g - 21.8g = 18.8g$

Relative density of liquid

$$\frac{\text{Mass of liquid}}{\text{Mass of water}} = \frac{18.8}{20} = \frac{1.88}{2} = 0.94$$

6 - From the following observations calculate the density and relative density of a brine solution.

a- Mass of empty density bottle $= 22g$

b- Mass of bottle + water $= 50g$

c- Mass of bottle + brine solution $= 54g$

Mass of empty density bottle $- M_1 = 22g$

Mass of density bottle + water $- M_2 = 50g$

Mass of density bottle + brine solution $- M_3 = 54g$

Mass of brine sol - ~~Mass of de~~ $M_3 - M_1 = 32g$

Mass of water - $M_2 - M_1 = 28g$.

$$\text{Density} = \frac{\text{Mass}}{\text{volume}} = \frac{32 g}{28 g} = 1.14 g \, cm^{-3}$$

$$\text{Relative density} : \frac{\text{Mass of water}}{\text{Mass of liquid}} = \frac{32g}{28g} = 1.14$$