HW 24/7/2021

Home Assignment

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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.

Ans- Given, Mass of empty density bottle $M_1 = 35g$

Mass of bottle + water $M_2 = 65g$

Mass of bottle + alcohol $M_3 = 59g$

Relative density of alcohol

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

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

2) Distinguish between density and relative density.

Ans- Density :-

The density of a substance is define as its mass per unit volume. That is :-

$$= \frac{\text{Mass of the substance}}{\text{volume of the substance}}$$

The density of a substance is represented by the symbol d.

Relative Density :-
The relative density of a substance is defined as the ratio of the density of the substance to the density of water.
That is :-

$$\frac{\text{Density of the substance}}{\text{Density of water}} =$$

The symbol used for relative density is R.D.

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

Ans- The statement 'Relative density of aluminium is 2.7' means, a piece of aluminium of any volume has mass 2.7 times that of equal volume of water that is aluminium is 2.7 times heavier than 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 40.6g. find:-

a) The volume of density bottle
b) The relative density of liquid

a) Mass of empty) density) bottle $M_1 = 21.8g$
Mass of empty bottle + water $M_2 = 41.8g$
Mass of empty bottle + liquid $M_3 = 40.6g$

Volume of density) bottle $= M_2 - M_1 = 41.8g - 21.8g = 20g$

Density of water is $1g\ cm^{-3}$
So, volume of density bottle = 20ml

b) Relative Density of liquid

$$= R.D = \frac{\text{Mass of liquid}}{\text{Mass of equal volume of water}}$$

$$= \frac{M_3 - M_1}{M_2 - M_1} = \frac{40.6 - 21.8}{41.8 - 21.8} = \frac{18.8}{20}$$

$$= 0.94\ ml$$

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

a) Mass of empty density bottle = 22g (M_1)
b) Mass of bottle + water = 50g (M_2)
c) Mass of bottle + brine solution = 54g (M_3)

Ans- Density of brine solution

$$= \frac{\text{Mass of oil}}{\text{Volume of oil}} = \frac{M_3 - M_1}{M_2 - M_1} = \frac{54-22}{50-22}$$

$$= \frac{32g}{28g} = 1.143 g cm^{-3}$$

Relative Density is $1.143 g cm^{-3}$

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