

25/12/24
HW

DENSITY OF FLUID USING DENSITY
BOTTLE, RELATIVE DENSITY
HOME ASSIGNMENT

①

When it is filled with alcohol

$$\text{alcohol} = 59 \text{ g}$$

$$\text{Mass alcohol} \Rightarrow m_a = 59 - 35$$

$$\text{Density of alcohol} = \frac{24 \text{ g}}{30}$$

$$= \frac{\text{Mass}}{\text{Vol of Bottle}} = \frac{24}{30} = 0.8 \text{ g/cm}^3$$

$$\text{R.D} = \frac{\text{density of alcohol}}{\text{density of water}} = 0.8$$

Let Volume of bottle whose mass is 35 gm

When filled with water the bottle = 65 - 35 gm

$$\text{Density of water} = \frac{\text{Mass}}{V} = 1$$

$$= \frac{30}{V} = 1$$

$$= 30 = V$$

② A density bottle is a specially designed bottle which is used to determine the density of a liquid. The size can be 25 mL or 50 mL. 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 & 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.

③ Density

→ Mass per unit volume of a substance is called density.

→ It measured -
SI unit = $\frac{\text{Kg}}{\text{m}^3}$

CGS unit = $\frac{\text{g}}{\text{cm}^3}$

Relative Density

* The ratio between gravity of a substance and density of water is called relative density

* It has no unit.

④

A piece of aluminium of any volume has mass 2.7 times that of equal volume of water. So, aluminium is 2.7 times ~~the~~ heavier than water.

⑤

(a) Mass of empty density water = $M_1 = 21.8\text{g}$

Mass of bottle + Water = $M_2 = 41.8\text{g}$

Mass of water = $(M_2 - M_1)$

$$= 41.8 \text{ g} - 21.8 = 20 \text{ g}$$

But 1 g of water has
volume = 1 cm^3

$$\begin{aligned} \text{Volume of } \overset{\text{density}}{\text{bottle}} \\ = \text{Volume of water} &= 20 \text{ cm}^3 \\ &= 20 \text{ ml} \end{aligned}$$

$$\begin{aligned} \text{(B) Mass of } 20 \text{ cm}^3 \text{ of liquid} \\ = (\text{Mass of density bottle} + \\ \text{Mass of } 20 \text{ cm}^3 \text{ of liquid} - \\ \text{Mass of density bottle}) \\ \Rightarrow 40.6 - 21.8 \\ = 18.8 \text{ g} \end{aligned}$$

$$\Rightarrow \text{Mass of } 20 \text{ cm}^3 \text{ of water} = 20 \text{ g}$$

$$\begin{aligned} \text{R.D} \\ \text{of liquid} &= \frac{\text{Mass of } 20 \text{ cm}^3 \\ \text{of liquid}}{\text{Mass of } 20 \text{ cm}^3 \\ \text{of water}} &= \frac{18.8}{20} \\ &= \frac{1.88}{2} \\ &= 0.94 \end{aligned}$$

⑥
 Mass of empty bottle = $M_1 = 22 \text{ g}$
 Mass of bottle + water = $M_2 = 50 \text{ g}$
 Mass of bottle + brine solution = $M_3 = 54 \text{ g}$

Mass of water = $M_2 - M_1 = 50 - 22 = 28 \text{ g}$

Mass of brine solution =

$\Rightarrow \frac{\text{Mass of brine solution}}{\text{Mass of water}}$

$\Rightarrow \frac{32}{28} = 1.14 \text{ g/cm}^3$

Relative Density = 1.14