Class-12th

SOLUTION & COLLIGATIVE PROPERTIES

EXPRESSING CONCENTRATION OF SOLUTIONS

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CONCENTRATION: -

Mass and Volume Percentage: -

MOLARITY (MOLAR CONCENTRATION)

It is defined as the number of moles of the solute dissolved in per litre or per dm3 of the solution, i.e.,

 $Molarity (M) = \frac{Number of moles of solute}{Number of litres of solution}$

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Molarity × Number of litres of solution = Number of moles of solute

Let w_A g of the solute of molecular mass m_A be dissolved in V litre of solution.

Molarity of solution = $\frac{w_A}{m_A \times V}$

or

Molarity \times $m_A = \frac{w_A}{v} =$ Strength of the solution

If V is taken in mL (cm^3), then

Molarity of the solution $= \frac{w_A}{m_A \times V} \times 1000$

The unit of molarity is mol L^{-1} s mol or mol dm^3

Percentage by weight

The number of grams of solute is dissolved in one gram of solution is called weight fraction of the solute. Thus,

weight fraction $=\frac{w}{w+W}$

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Chemistry

Where 'w' grams of solute is dissolved in W grams of solvent.

weight percent = $\frac{\text{weight of solutein grams} \times 100}{\text{weight of solution in grams.}}$

$$w = \frac{w \times 100}{w + W}$$

Percent by volume (Volume fraction)

This method is used for solutions of liquid in a liquid. The volume of liquid (solute) in mL dissolved in one mL of solution is called **volume fraction**.

Volume fraction = $\frac{\text{Volume of liquid solute in mL}}{\text{volume of solution in mL}}$

Volume percent = $\frac{\text{Volume of solute} \times 100}{\text{Volume of solution}}$

Ex. If we have 6% w/w urea solution with density 1.060 g/mL, then calculate its strength in g/L?

Sol. 6 g urea is present in 100 gm solution.

$$6 \text{ g in} \frac{100}{1.060} \text{ mL}$$

$$\frac{100}{1.060} \text{ mL} \longrightarrow 6 \text{ gm.}$$

:. 1000 mL = $\frac{6}{100} \times 1.060 \times 1000 = 10.6 \times 6 = 63.6$