Lecture 2

Dr. Rusul H. Hamza



Definition

A <u>solution</u> is a homogeneous mixture of two or more substance

OR

A solution is a homogenous mixture of solute and solvent.

A solute is dissolved in a solvent

- solute is the substance being dissolved
- solvent is the liquid in which the solute is dissolved
- an *aqueous* solution has water as solvent

Dilute Solutions: A solution containing relatively small quantity of solute as compared with the amount of solvent.

Concentrated Solution: A solution containing large amount of solute in the solution than that in dilute solution.

saturated solution is one where the concentration is at a maximum - no more solute is able to dissolve at a given temperature.

Super Saturated Solution:

A solution that contains relatively larger amount of solute than that required for saturation it is prepared by heating and adding more and more solute.

CONCENTRATION EXPRESSION 5 ways of expressing concentration -Mass percent: (mass solute / mass of solution) * 100 -Molarity(M): moles solute / Liter solution -Molality (m) - moles solute / Kg solvent -Normality (N)- gram equivalent of solute/ liter solution -Mole Fraction(x_{λ}) - moles solute / total moles solution

Percentage Expression

Mass % of A =

<u>mass of A in solution</u> × 100 total mass of solution

%Concentration

% (w/w) = $\frac{mass \ solute}{mass \ solution} \times 100$

 $\% (w/v) = \frac{mass \ solute}{volume \ solution} x100$

% (v/v) =

volume solute volume solution x100

% w/w:

It expresses the no. of grams of the solute per 100 gram of the solution.

e.g. a 10 % w/w aqueous glycerine solution means 10 g of glycerine dissolved in sufficient water to make overall 100 gram of the solution.

% v/v:

It expresses the no. of milliliters of the solute per 100 milliliters of the solution.

e.g. a 10 % v/v aqueous ethanolic solution means 10 ml of ethanol dissolved in sufficient water to make overall 100 mls of the solution.

% w/v

It expresses the no. of grams of the solute per 100 mls of the solution.

e.g. a 10 % w/v aqueous Nacl solution means 10 g of Nacl dissolved in sufficient water to make overall 100 mls of the solution.

Parts per Million and Parts per Billion

ppm denotes the amount of given substance in a total amount of 1,000,000 of solution

ppb denotes the amount of given substance in a total amount of 1,000,000,000 of solution

Parts per Million and Parts per Billion Parts per Million (ppm) mass of A ppm =× 1()⁶ total mass of solution Parts per Billion (ppb) mass of A $\times 10^{9}$ ppb = total mass of solution