Class XII
Chemistry
Ch. 2: Solutions

Important formulae & Concepts

1. Mass percentage of a component (w/w)

$$= \frac{\text{Mass of component in solution}}{\text{Toal mass of solution}} \times 100$$

2. Volume percentage of a component (v/v)

$$= \frac{\text{Volume of the component}}{\text{Total volume of solution}} \times 100$$

3. Mole fraction of a component (x) $= \dfrac{\text{Number of moles of the component}}{\text{Total number of moles of all components}}$

4. $\text{Parts per million} = \dfrac{\text{Number of parts of component}}{\text{Total number of parts of all components of solution}} \times 10^6$

5. $\text{Molarity} = \dfrac{\text{Number of moles of solute}}{\text{Volume of solution in litres}}$

6. $\text{Molality} = \dfrac{\text{Number of moles of solute}}{\text{Mass of solvent in kilograms}}$

7. $\text{Normality} = \dfrac{\text{Number of gram equivalent of solute}}{\text{Volume of solution in litres}}$

8. $\dfrac{p_1^{\circ} - p_1}{p_1^{\circ}} = x_2$

9. $\Delta T = T_b - T_b^{0}$

$$\Delta T_b = \frac{K_b \times 1000 \times w_2}{M_2 \times w_1}$$

10. $\Delta T = T_f^{0} - T_f$

$$\Delta T_f = \frac{K_f \times 1000 \times w_2}{M_2 \times w_1}$$

11. $\pi = CRT$

12. $M_2 = \frac{w_2 RT}{\pi V}$

13.

$$i = \frac{\text{Normal molar mass}}{\text{Abnormal molar mass}}$$

$$= \frac{\text{Observed colligative property}}{\text{Calculated colligative property}}$$

$$= \frac{\text{Total number of moles of particles after association/dissociation}}{\text{Total number of moles of particles before association/dissociation}}$$

14. Inclusion of van't Hoff factor modified the equations for colligative properties as:

$$\frac{p_1^{\circ} - p_1}{p_1^{\circ}} = i.\frac{n_2}{n_1}$$

$$\Delta T_b = i.\frac{K_b \times 1000 \times w_2}{M_2 \times w_1}$$

$$\Delta T_f = i.\frac{K_f \times 1000 \times w_2}{M_2 \times w_1}$$

$$\pi = i.\frac{n_2 RT}{V}$$

15. According to Raoult's law for a solution of volatile liquids the partial vapour pressure of each component in the solution is directly proportional to its mole fraction.

$p_1 = p^{\circ}_1 x_1$; $p_2 = p^{\circ}_2 x_2$

Using Dalton's law of partial pressures the total pressure of solution is calculated.

$p_{total} = p_1^{\circ} + (p_2^{\circ} - p_1^{\circ}) x_2$