Chemistry Study Materials for Class 12
(NCERT Based Notes of Chapter -02)
Ganesh Kumar Date:- 03/05/2021

Key Learning of Chapter -2 (Solution)

21. The solutions which show a large positive deviation from Raoult's law form minimum boiling azeotrope at a specific composition.
22. The solutions that show large negative deviation from Raoult's law form maximum boiling azeotrope at a specific composition.
23. Properties of solution which depends on only the number of solute particles but not on the nature of solute are called colligative properties.
24. There are four colligative properties:
    (i) Relative lowering of vapour pressure (ii) Elevation of boiling point
    (iii)Depression of freezing point (iv) Osmotic pressure
25. Relative lowering of vapour pressure: Difference in the vapour pressure of pure solvent (p_1°) and solution (p_1) represents lowering in vapour pressure ($p_1^\circ - p_1$). Dividing lowering in vapour pressure by vapour pressure of pure solvent is called relative lowering of vapour pressure

$$\frac{(P_1^0 - P_1)}{P_1^0}$$

26. Relative lowering of vapour pressure is directly proportional to mole fraction of solute. Hence it is a colligative property.

$$\frac{(P_1^0 - P_1)}{P_1^0} = X_2$$

27. Elevation of boiling point: The difference in boiling points of solution (T_b) and pure solvent (T^0) is called elevation in boiling point
28. For a dilute solution elevation of boiling point is directly proportional to molal concentration of the solute in solution.Hence it is a colligative property.

$$\Delta T_b = \frac{K_b \times 1000 \times W_2}{M_2 \times w_1}$$

29. Depression of freezing point: The lowering of vapour pressure of solution causes a lowering of freezing point compared to that of pure solvent. The difference in freezing point of the pure solvent (T_f^0) and solution (T_f) is called the depression in freezing point.

$$\Delta T = T_f^0 - T_f$$

30. For a dilute solution depression in freezing point is a colligative property because it is directly proportional to molal concentration of solute.

$$\Delta T_f = \frac{K_f \times 1000 \times W_2}{M_2 \times w_1}$$

31. Two solutions having same osmotic pressure at a given temperature are called isotonic solution.
32. If a solution has more osmotic pressure than other solution it is called hypertonic solution.
33. If a solution has less osmotic pressure than other solution it is called hypotonic solution.
34. Reverse osmosis: The process of movement of solvent through a semi permeable membrane from the solution to the pure solvent by applying excess pressure on the solution side is called reverse osmosis.
35. Colligative properties help in calculation of molar mass of solutes.
36. Molar mass that is either lower or higher than expected or normal molar mass is called as abnormal molar mass.
37. Van't Hoff factor (i) accounts for the extent of dissociation or association.

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

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

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

Value of i is less than unity in case solute undergo association

Value of i is greater than unity in case solute undergo dissociation

38. Inclusion of Van't Hoff factor modifies the equations for colligative properties as:

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

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

$$\frac{(P_1^0 - P_1)}{P_1^0} = i\, n_2/n_1 \qquad \pi = \frac{i.\, n_2 RT}{V}$$

****