

Unit
2
Solutions

Colligative Properties:

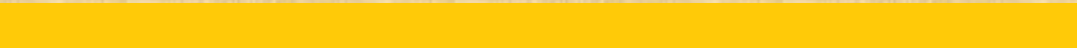
- The properties of dilute solutions, which depend only on no. of particles present in solution are called Colligative properties.

Relative lowering of vapour pressure:

- The ratio of lowering of vapour pressure to that of vapour pressure of pure solvent is known as RLVP.
- Relative lowering of vapour pressure of dilute solution is equal to mole fraction of solute.

$$\frac{P^{\circ} - P}{P^{\circ}} = \chi_2 \quad (\text{or}) \quad \frac{P^{\circ} - P}{P^{\circ}} = \frac{W_2 \times M_1}{M_2 \times W_1}$$

Elevation of boiling point:



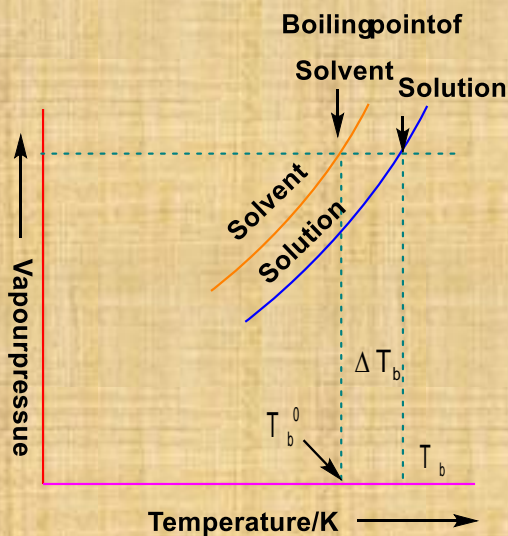


Fig. The vapour pressure curve for solution lies below the curve for pure water. The diagram shows that ΔT_b denotes the elevation of boiling point of a solvent in solution

Increase in boiling point of solution compared to that of pure solvent is known as Elevation of boiling point.

$$\Delta T_b = T_b - T_b^0$$

Elevation in boiling point of dilute solutions is directly proportional to molality of solution.

$$\Delta T_b \propto m \Rightarrow \boxed{\Delta T_b = K_b \cdot m}$$

K_b is known as molal elevation constant.

$$\Delta T_b = K_b \cdot \frac{1000 \times W_2}{M_2 \times W_1}$$

$$\Rightarrow M_2 = \frac{1000 \times W_2 \times K_b}{\Delta T_b \times W_1}$$

Value of K_b depends on nature of solvent. Its units are $K \text{ kg mol}^{-1}$.