

Colligative Properties / Democratic properties

Properties of solution that depend only upon number of solute particles in solution are called colligative properties.

Types of colligative properties

- i) Relative lowering in vapour pressure (RLVP)
- ii) Elevation in boiling point
- iii) Depression in freezing point
- iv) Osmotic pressure

Conditions of Colligative Properties

- i) Solution should be dilute
- ii) Solute should be non volatile

Relative Lowering in vapour pressure (RLVP)

Raoult's Law

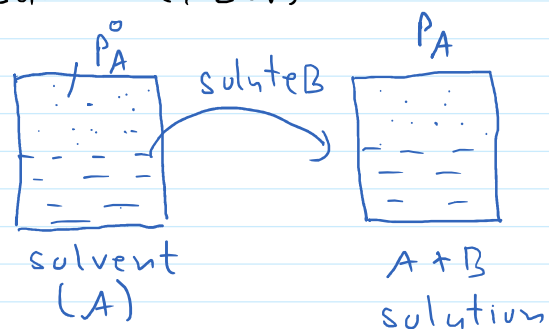
$$P_A = P_A^\circ \chi_A$$

$$P_A = P_A^\circ (1 - \chi_B)$$

$$P_A = P_A^\circ - P_A^\circ \chi_B$$

$$P_A^\circ \chi_B = P_A^\circ - P_A = \text{Lowering in vapour pressure}$$

$$\boxed{\frac{P_A^\circ - P_A}{P_A^\circ} = \chi_B} = \text{RLVP}$$



$$\frac{P_A^\circ - P_A}{P_A^\circ} = \frac{n_B}{n_B + n_A}$$

$$\frac{P_A^\circ}{P_A^\circ - P_A} - 1 = \frac{n_B + n_A}{n_B} - 1$$

$$\frac{P_A - (P_A^\circ - P_A)}{P_A^\circ - P_A} = \frac{n_B + n_A - n_B}{n_B}$$

$$\frac{P_A}{P_A^\circ - P_A} = \frac{n_A}{n_B}$$

$$\boxed{\frac{P_A^\circ - P_A}{P_A} = \frac{n_B}{n_A}}$$