Brainbox learn easy

Unit 2

Solutions

Ideal and Non-ideal solutions:

- The solutions which obey Raoult's law over entire range of concentrations are known as ideal solutions,

  For ideal solutions,

$$P = P_1^0 \chi_1 + P_2^0 \chi_2$$

  Enthalpy of mixing $\Delta H_{mix} = 0$

  Volume of mixing $\Delta V_{mix} = 0$

  This is because, solute solvent interactions are same as, solute – solute and solvent – interactions.

- The solutions which doesn't obey Raoult's law over entire range of concentrations are known as Non-ideal solutions.

$$P \neq P_1^0 \chi_1 + P_2^0 \chi_2$$

  For non-ideal solutions,

  Enthalpy of mixing $\Delta H_{mix} \neq 0$

  Volume of mixing $\Delta V_{mix} \neq 0$

Non-ideal solutions may show positive or negative deviation from ideal behaviour.

Non-ideal solutions with positive deviations:

For these solutions, solute solvent interactions are weaker.

Vapour pressure (P) of solution is greater than predicted.

$$P > P_1^0 \chi_1 + P_2^0 \chi_2$$

Enthalpy of mixing ΔH_{mix} and volume of mixing are positive.

Ex. Ethanol in water

Non-ideal solutions with negative deviations:

For these solutions, solute – solvent interactions are stronger.

Vapour pressure (P) of solution is less than predicted.

$$P < P_1^0 \chi_1 + P_2^0 \chi_2$$

Enthalpy of mixing ΔH_{mix} and volume of mixing are negative.

Ex. Nitric acid in water

- Non ideal solutions with positive deviations form minimum boiling azeotropes while non-ideal solutions with positive deviations.