

1.3 Solubility

The science of dissolution, dynamic equilibrium, and molecular interactions.



Defining the Absolute Limit

Solubility is the maximum amount of a substance that can be dissolved in a specified amount of solvent at a specified temperature.

[Nature of Solute/Solvent]

[Temperature]

[Pressure]

In real life, pure substances are rare. Solutions drive biological, industrial, and chemical systems—from blood plasma to brass.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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Key Highlights

- » Free Study Material, Videos & Infographics
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- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



Solution Capacity & Limits

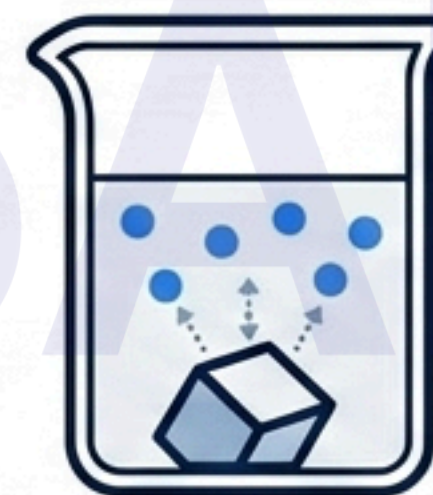
Unsaturated Solution



More solute can still be dissolved at the current temperature.

Solute Concentration < Maximum Capacity

Saturated Solution



No more solute can be dissolved at the same temperature and pressure. The solution is in dynamic equilibrium with the undissolved solute.

Solute Concentration = Maximum Capacity

The Rule of Molecular Compatibility



A solute dissolves in a solvent if their intermolecular interactions are similar.

**Polar Solute +
Polar Solvent**

(e.g., Sodium Chloride /
Sugar + Water)

✓ [Dissolves Readily]

**Non-Polar Solute +
Non-Polar Solvent**

(e.g., Naphthalene /
Anthracene + Benzene)

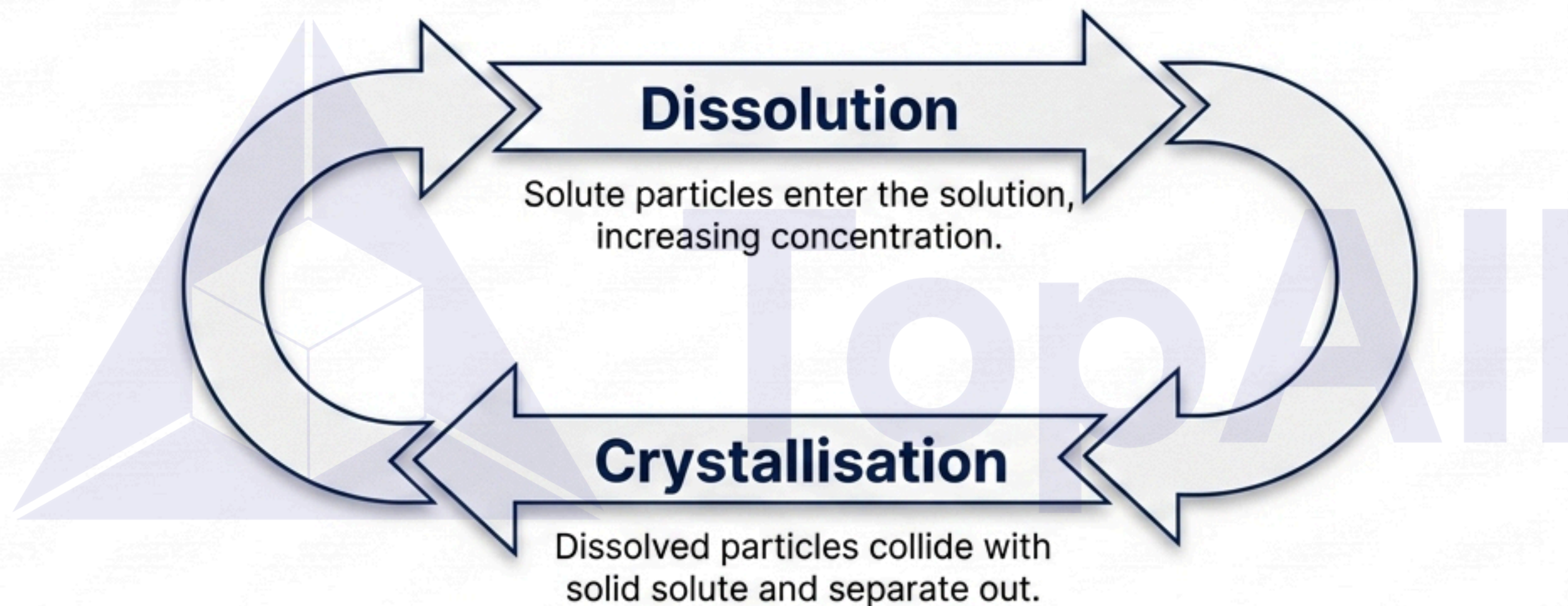
✓ [Dissolves Readily]

**Polar Solute +
Non-Polar Solvent**

(or vice versa)

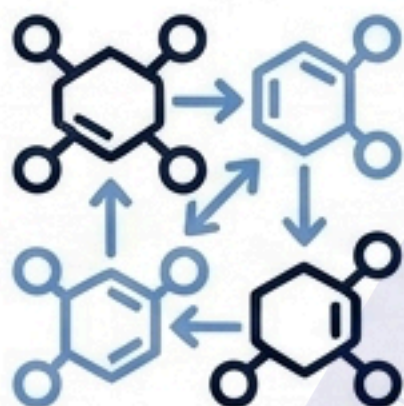
✗ [Does Not Dissolve]

The Balancing Act of Solutions



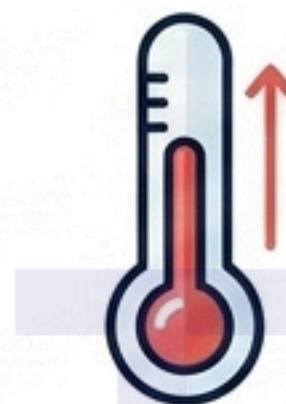
Dynamic Equilibrium is reached when the rate of dissolution exactly equals the rate of crystallisation. Under given conditions, concentration remains perfectly constant.

The 3 Drivers of Solubility



Nature of Substances

Governed by the 'Like dissolves like' rule based on the similarity of polar or non-polar intermolecular forces.



Temperature

Governed by Le Chatelier's Principle.

Endothermic ($\Delta_{\text{sol}}H > 0$) → Solubility increases with heat.

Exothermic ($\Delta_{\text{sol}}H < 0$) → Solubility decreases with heat.



Pressure

Insignificant effect on solid-in-solid-in-liquid solutions because solids and liquids are highly incompressible.

(Note: Highly critical for gas-in-liquid solutions, governed by Henry's Law).



You've Learned the Theory.

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