

SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES

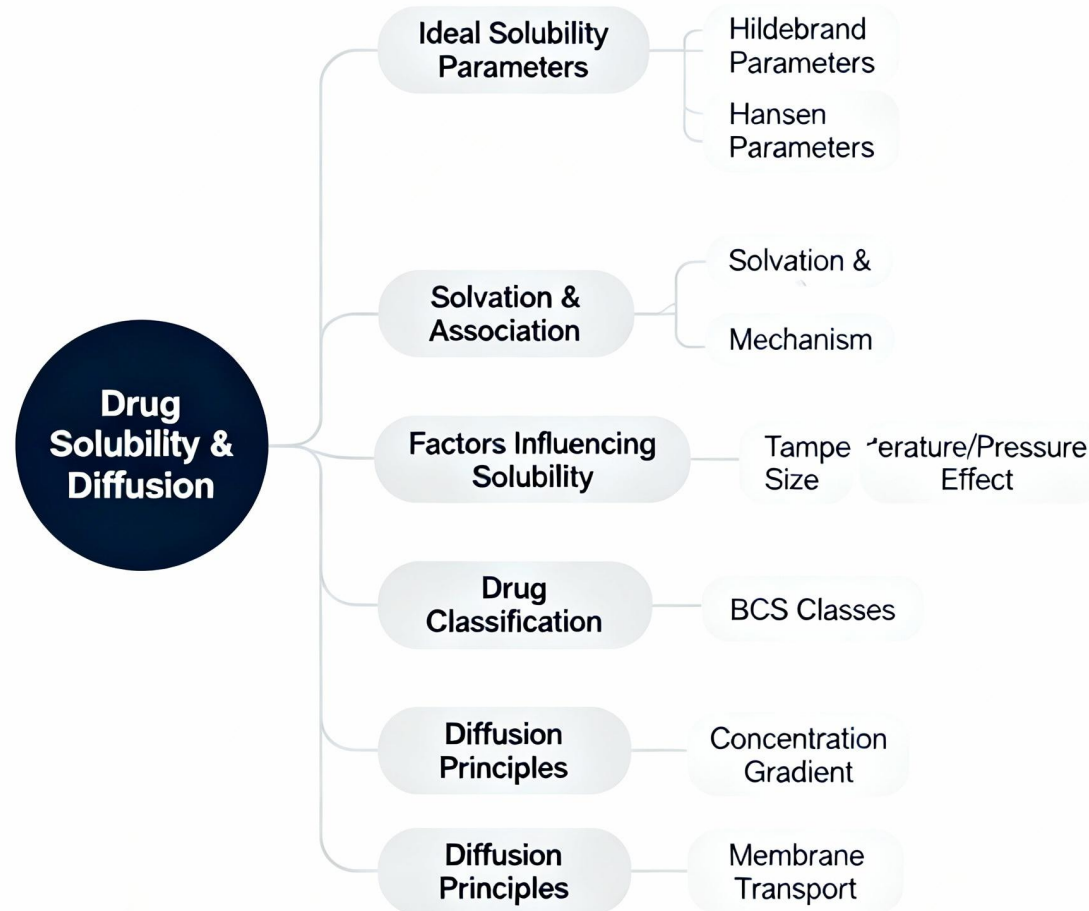


Affiliated To The Tamil Nadu Dr. MGR Medical University, Chennai
Approved by Pharmacy Council of India, New Delhi.
Coimbatore -641035

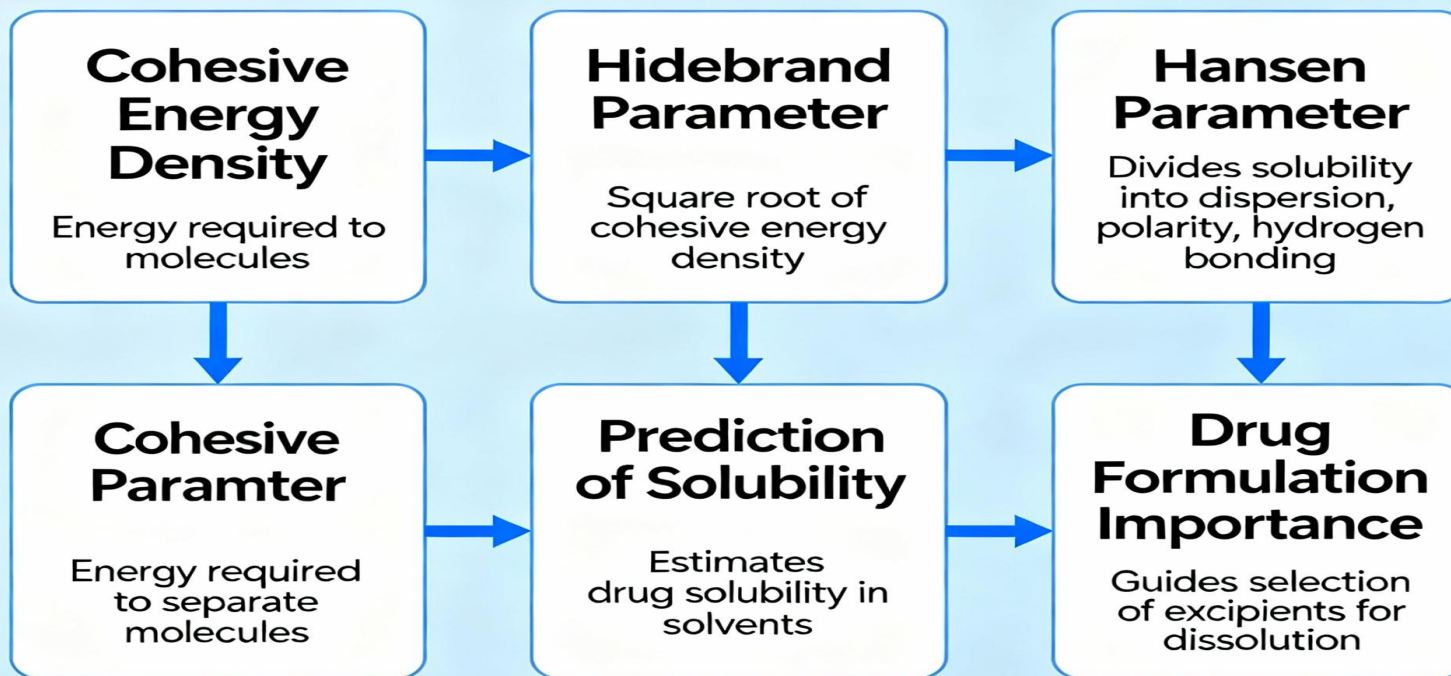
COURSE NAME :PHYSICAL PHARMACEUTICS (BP 302 T)

III SEM / II YEAR

TOPIC 1 : Ideal Solubility Parameters & Influencing Factors

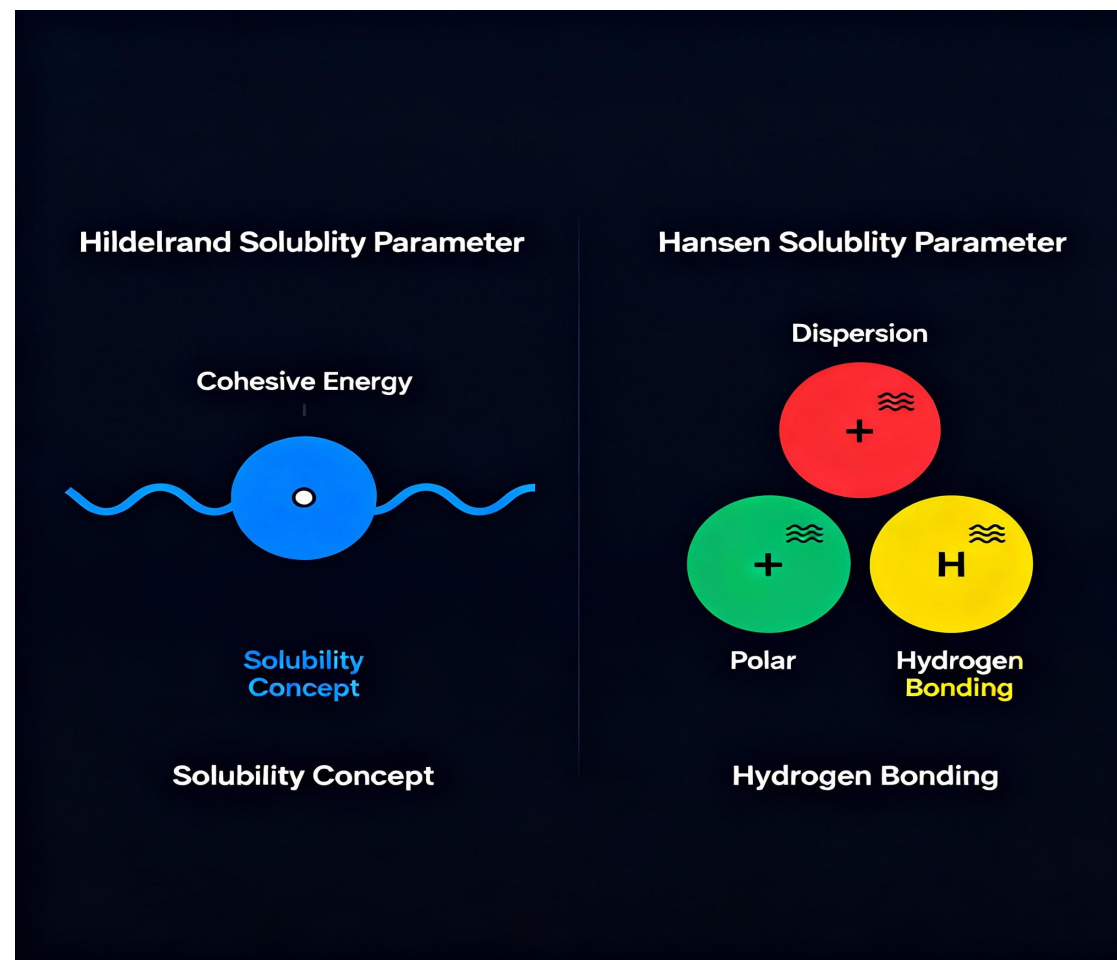


Ideal Solubility Parameters: Definition and Drug Solubility Importance

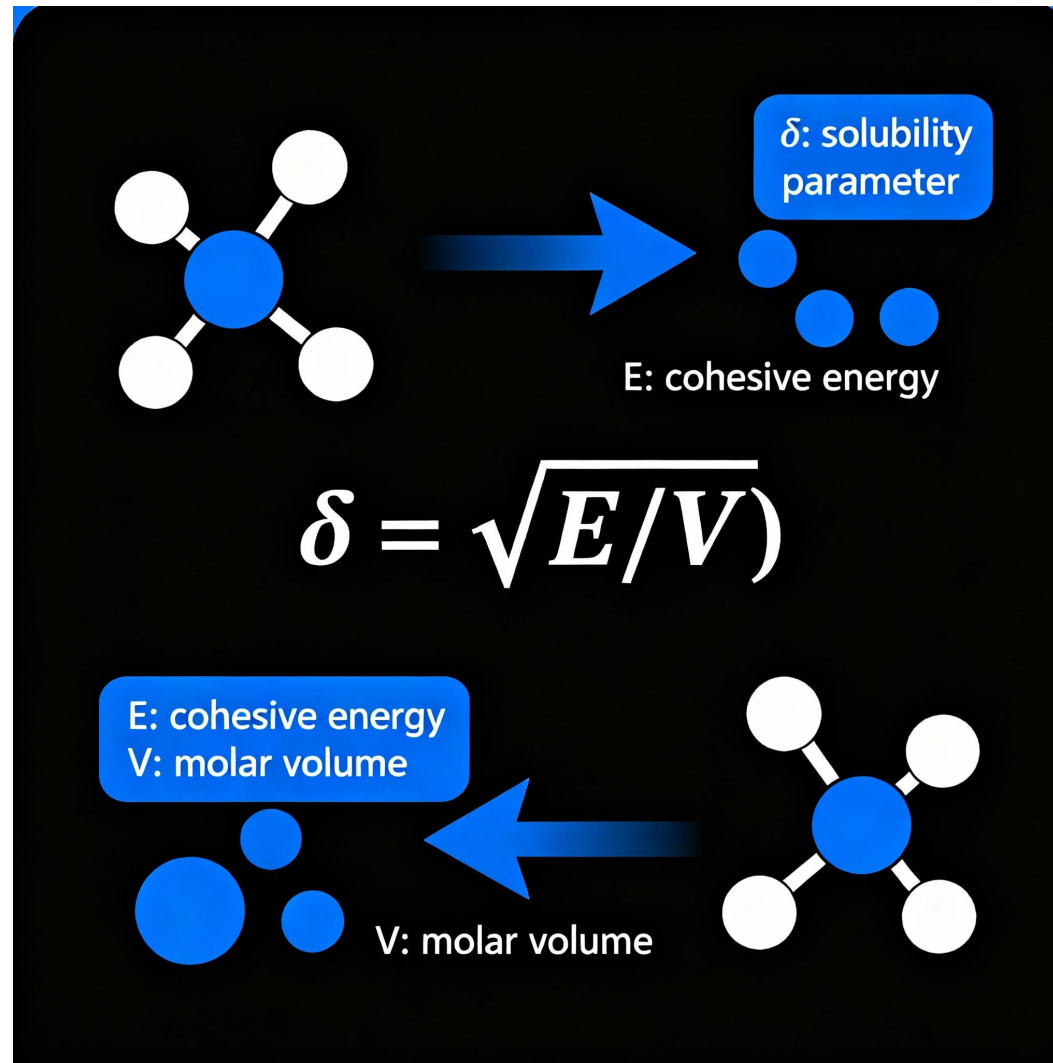


Hildebrand and Hansen Solubility Parameters

	Parameter Definitions	Components	Application Areas	Calculation Methods
Hildebrand	Hildebrand: Total cohesive energy density	Single parameter (δ)	Hildebrand: General	Hildebrand: $\delta = (E/V)^{0.5}$
	Hansen: cohesive energy density	Single parameter (δ)	<i>diurnal b/c prediction</i>	General solubility prediction
Hansen	Hansen: Dispersion, polar, hydrogen bonding components	Hansen: Three parameters ($\delta_d, \delta_p, \delta_h$)	Hansen: Polymer, coating, pharmaceutical application.	Hansen: δ_d from molar attraction constants, δ_p/δ_h from group contributions

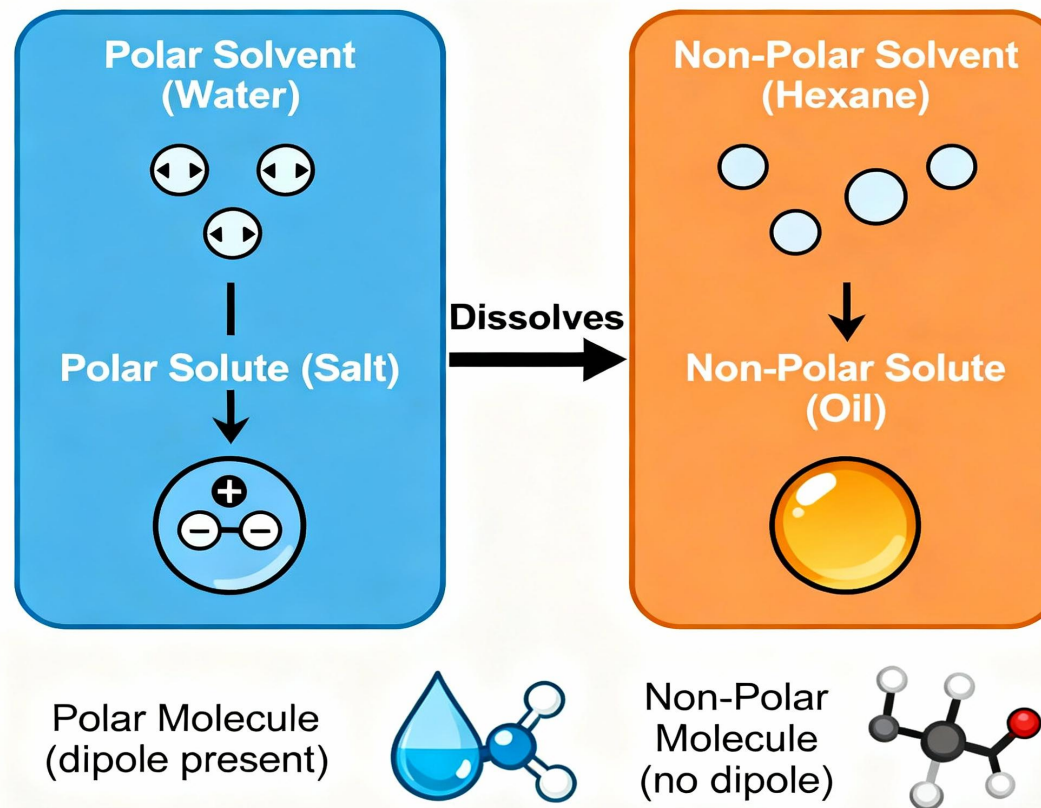


Cohesive Energy Density & Solubility Parameter Equation

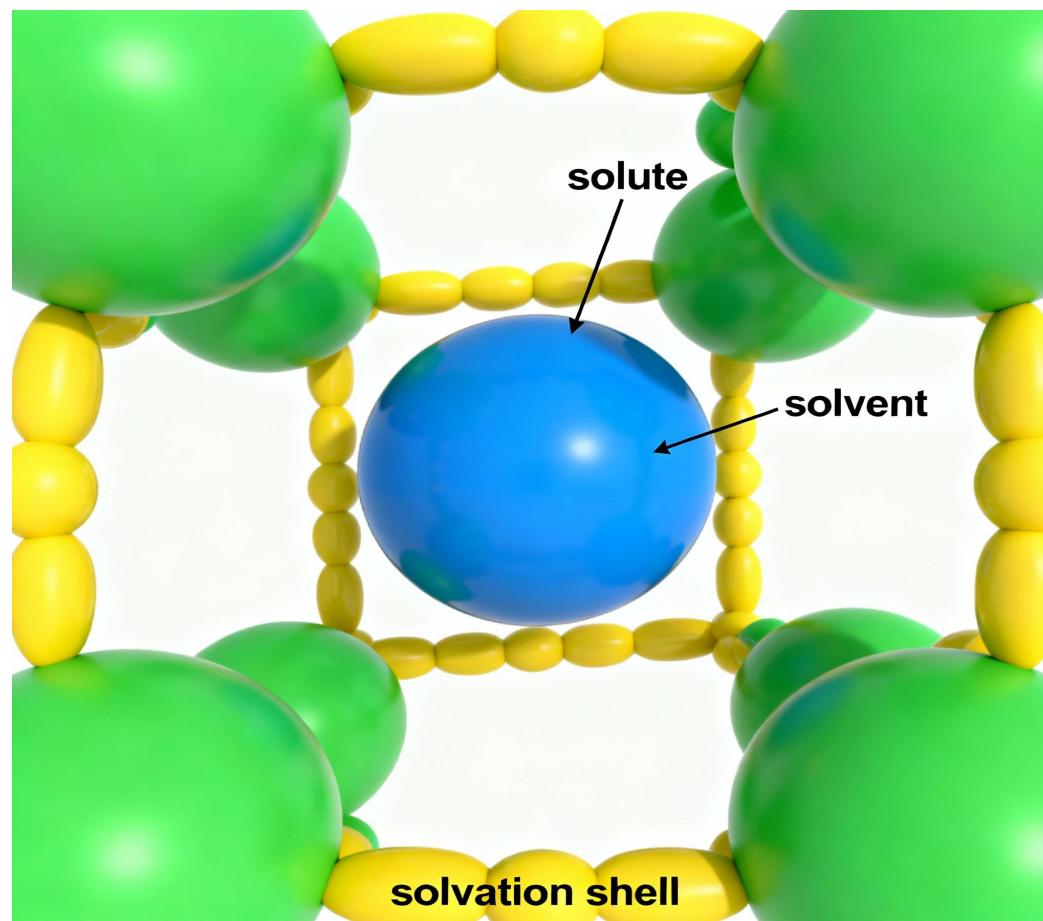


Concept of Ideal Solubility

Like Dissolves Like: Ideal Solubility Concept Diagram

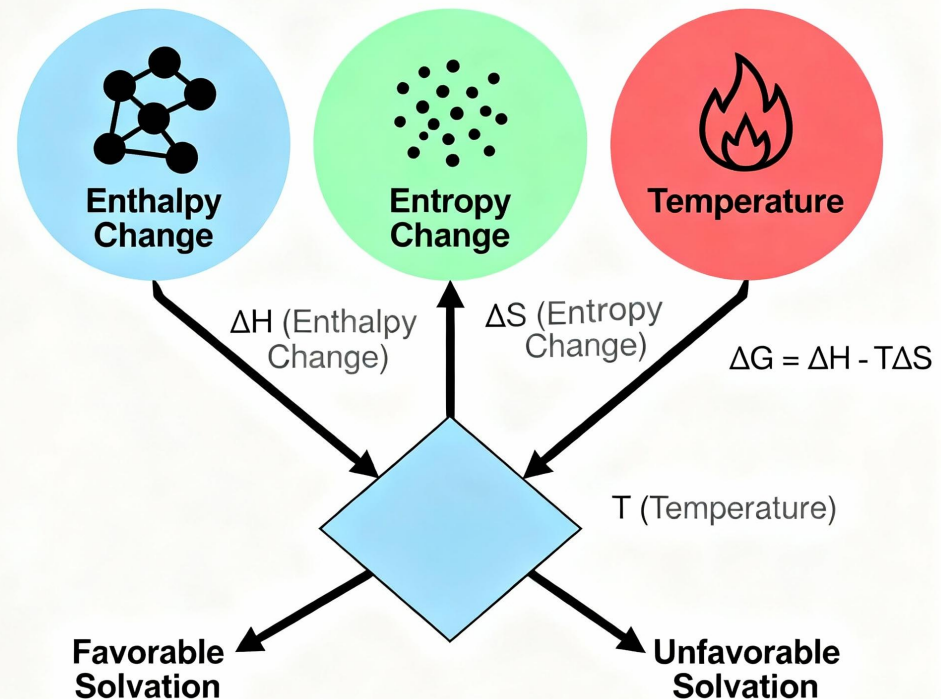


Solvation: Definition and Mechanism



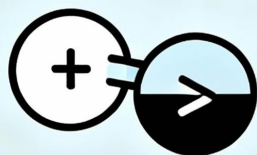
Solvation: Enthalpy, Entropy, Temperature Balance

Solvation Process: Enthalpy, Entropy, and Temperature Balance



Association: Definition and Ion Pair Types

Ion Pairs



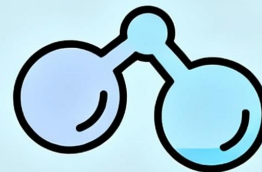
Example:
Sodium and chloride
ions in solution

Hydrogen Bonds



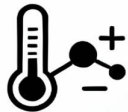
Example:
Water molecules
forming hydrogen
bonds

Van der Wals Forces

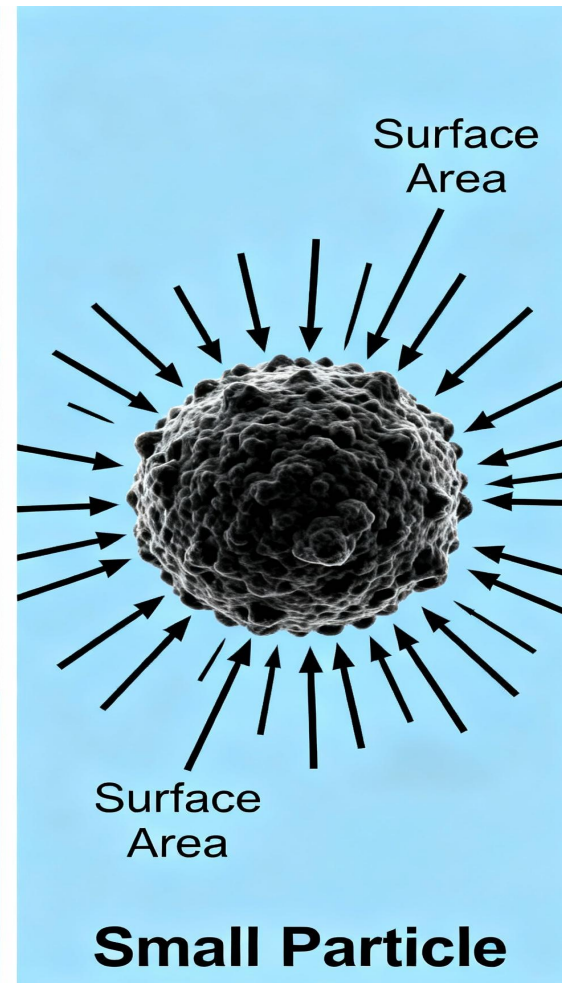
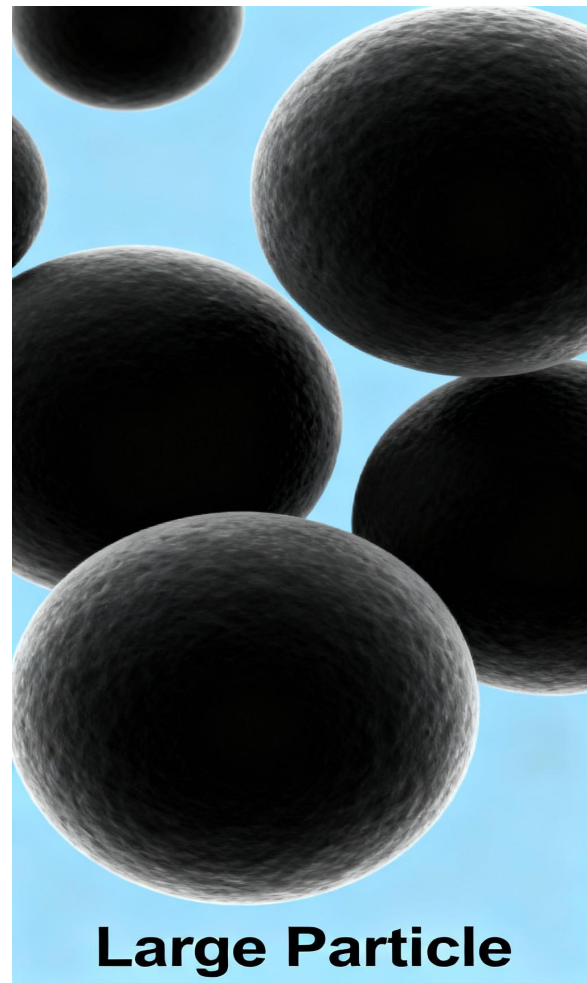


Example:
Non-polar drug
molecules interacting

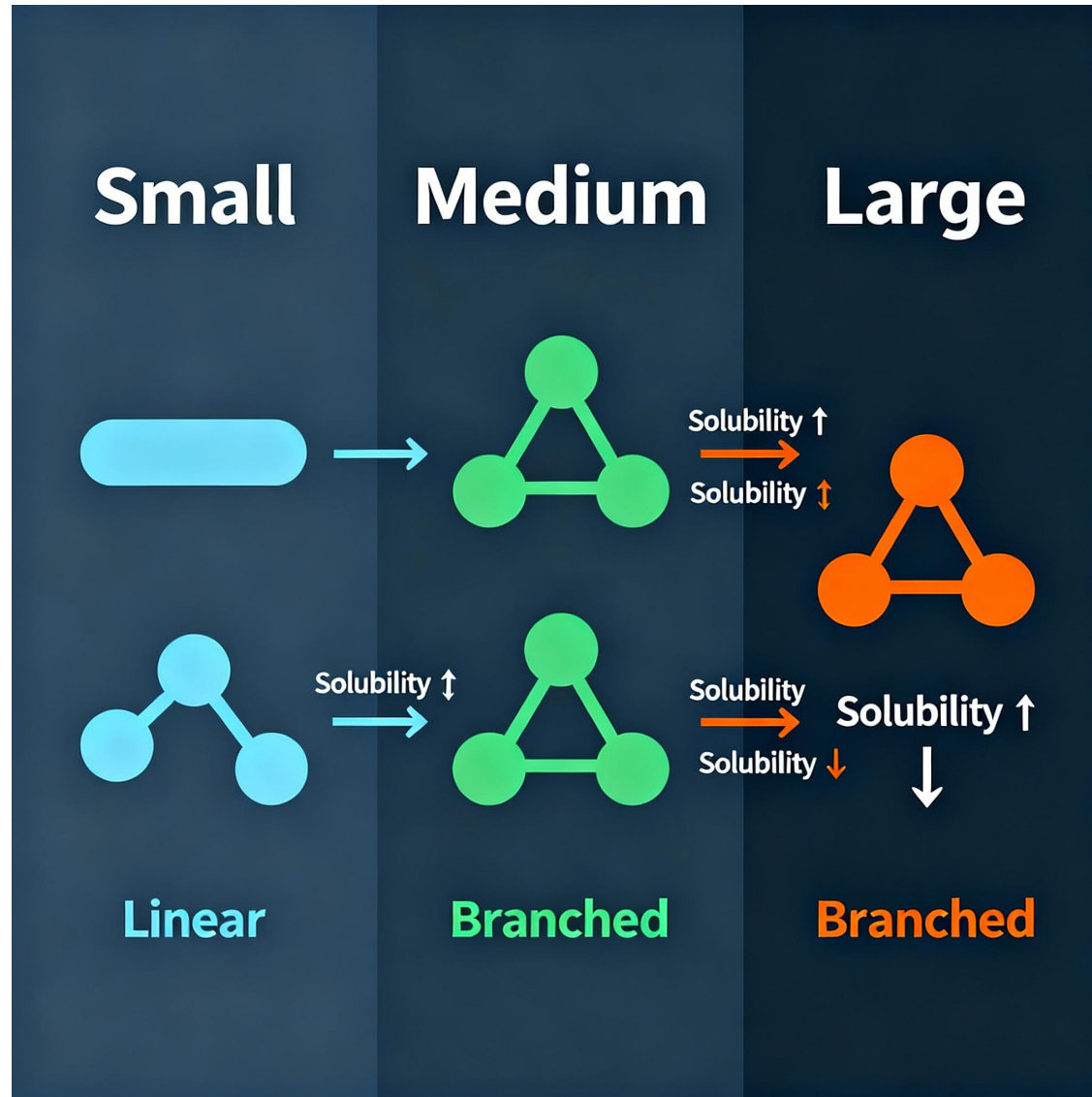
Key Factors Influencing Solvation and Molecular Association in Drug Solubility

Factor	Description	Icon
Solvent Polarity	Determines interaction strength between solvent and solute molecules	
Temperature icon	Affects kinetic energy and intermolecular forces	
Pressure icon	Influences solubility of gases in liquids	size comparison icon 
Molecular Strength Size	Alters ion-solvent interactions	Salt crystal icon 
Hydrogen Bonding Capacity	Impacts solute-solvent and solute-solute associations	hydrogen bond icon 

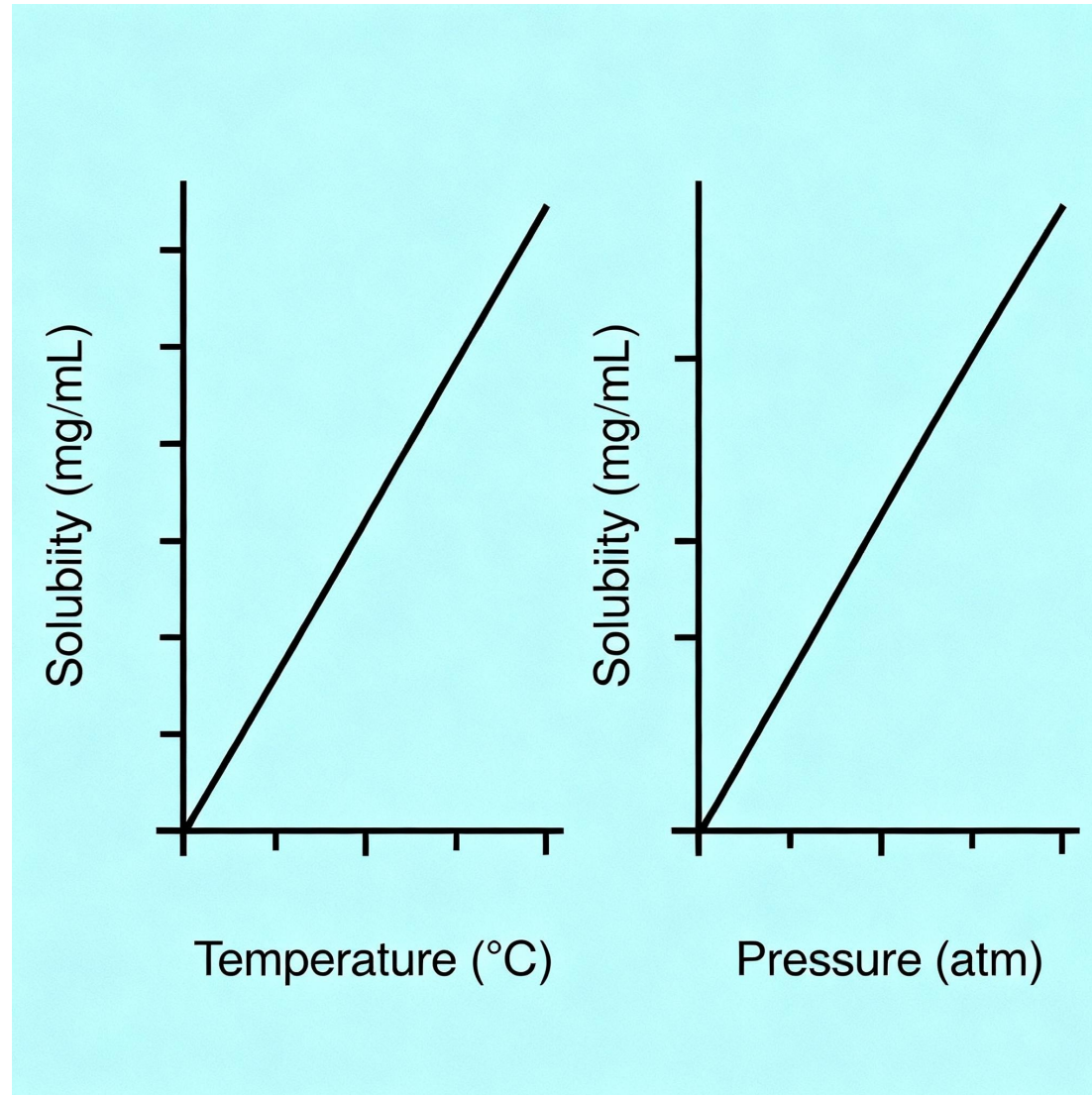
Particle Size Effect on Drug Solubility



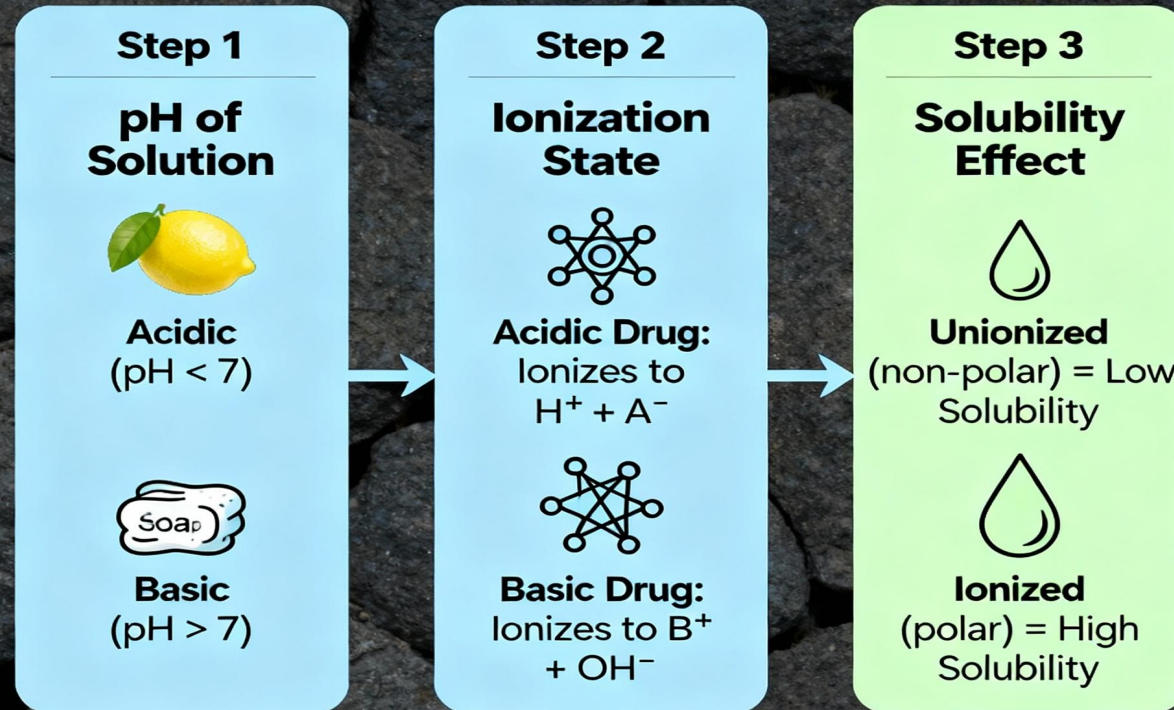
Molecular Size and Structure Effects



Temperature and Pressure Impact on Solubility



Role of pH and Ionization on Drug Solubility



Surface Area and Agitation Effects



Drug Solubility Classification

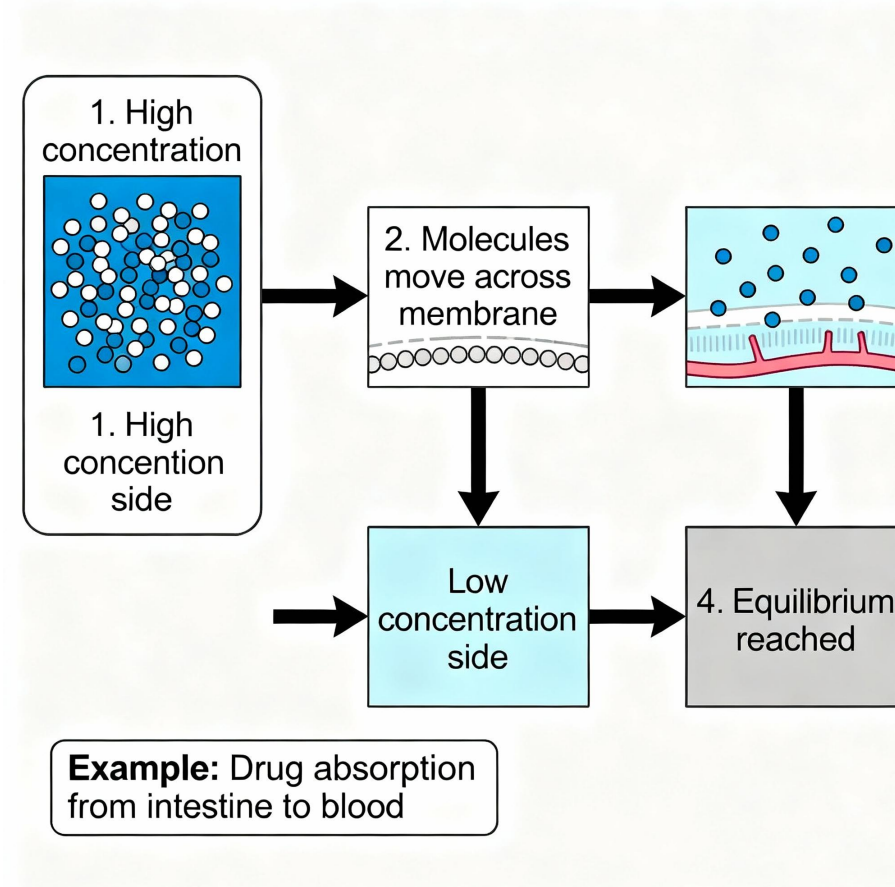
Class I: High Solubility, High Permeability	Class II: Low Solubility, High Permeability	Class III: High Solubility, Low Permeability	Class IV: Low Solubility, Low Permeability
Solubility: $\geq 85\%$ dose dissolved Permeability: $\geq 90\%$ absorption	Solubility: $< 85\%$ dose dissolved Permeability: $\geq 90\%$ absorption	Solubility: $\geq 85\%$ dose dissolved Permeability: $< 90\%$ absorption	Solubility: $< 85\%$ dose dissolved Permeability: $< 90\%$ absorption
			
			
Amoxicillin, Metoprolol	Ibuprofen, Griseofulvin	Cimetidine, Ranitidine	Furosemide, Ketoconazole

ASSESSMENTS

1.Explain how concentration gradient drives the diffusion process in biological systems and give an example related to drug absorption.



Explain how concentration gradient drives the diffusion process in biological systems and give an example related to drug absorption.



2. Describe the role of diffusion in nutrient transport across cell membranes and why it is vital for cellular function.

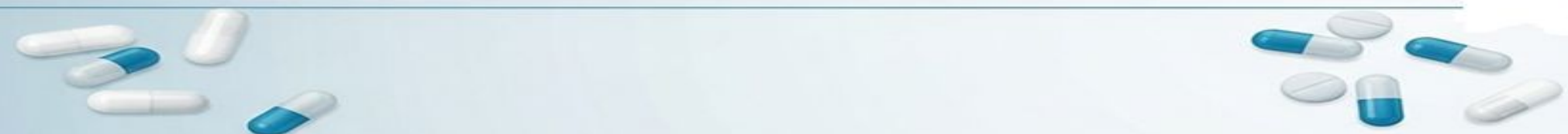


Describe the role of diffusion in nutrient transport across cell membranes and why it is vital for cellular function.

- Diffusion allows nutrients to passively move from areas of high concentration outside the cell to lower concentration inside, without energy use.
- This process helps cells take in essential molecules like oxygen and glucose while removing waste.
- It is vital because it supports cell metabolism and maintains balance in the cell environment.

REFERENCES

- Physical Pharmaceutics textbooks and lecture notes on solubility and solution chemistry.
- Hansen, C. M. (2007). Hansen Solubility Parameters: A User's Handbook. CRC Press.
- "Solubility and Solute-Solvent Interactions," Slideshare.net, 2023-2024 presentations.
- PharmacyGuideline.com article on "Solubility Expressions and Mechanisms of Solute Solvent Interactions," 2024.



Thank You

