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

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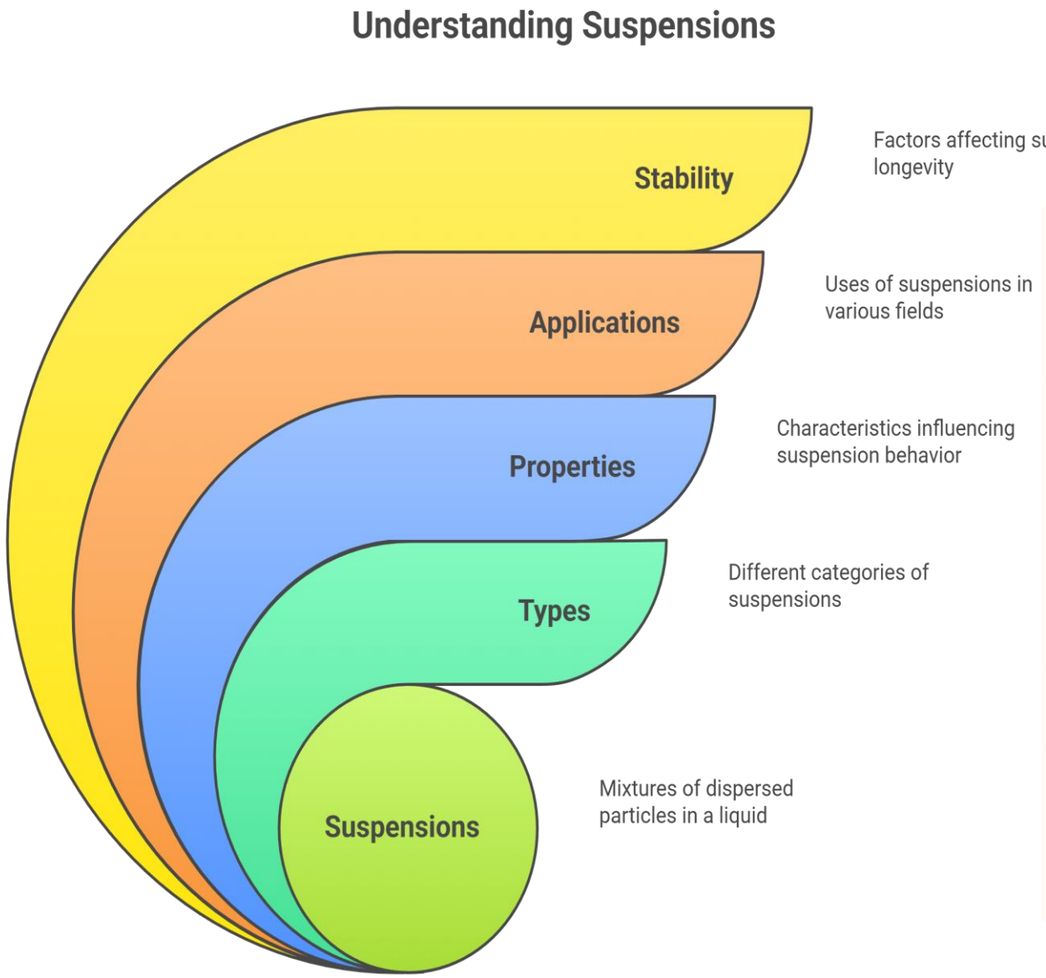
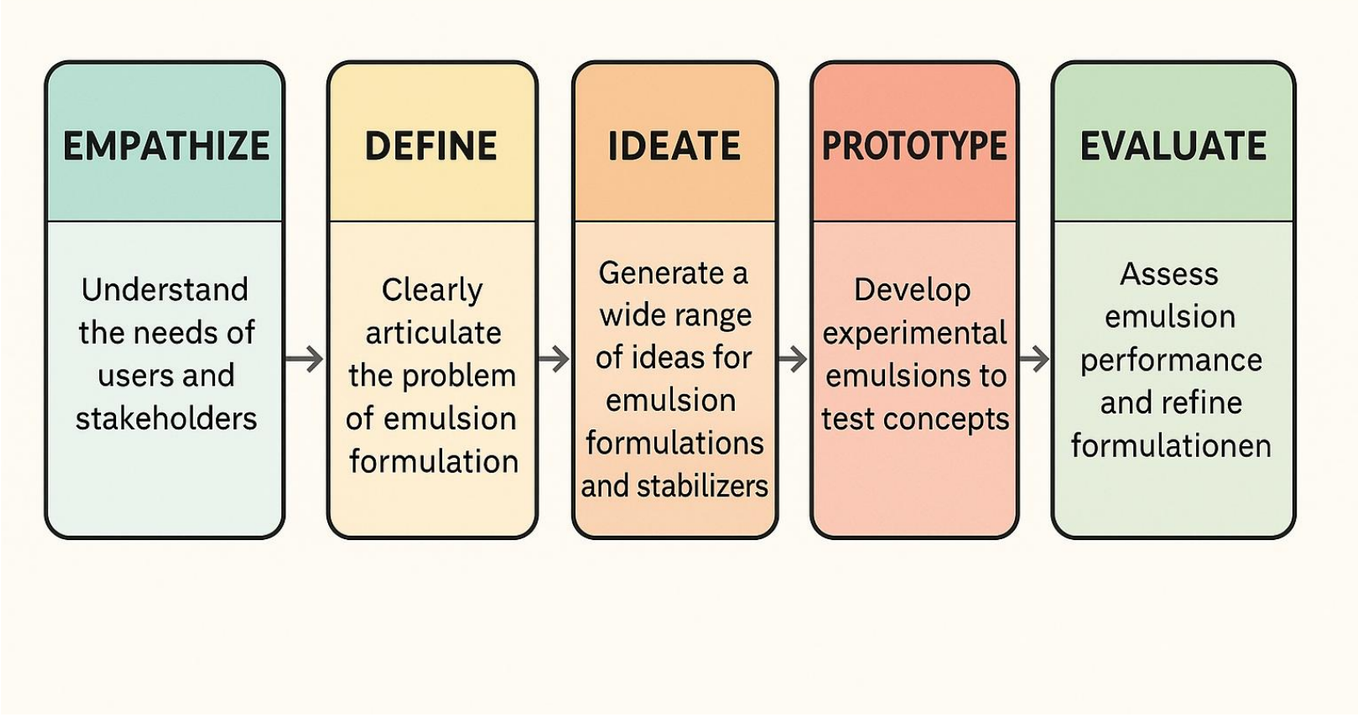
COURSE NAME: PHARMACEUTICS I

(BP 103 T) I YEAR / I SEM

TOPIC: SUSPENSIONS

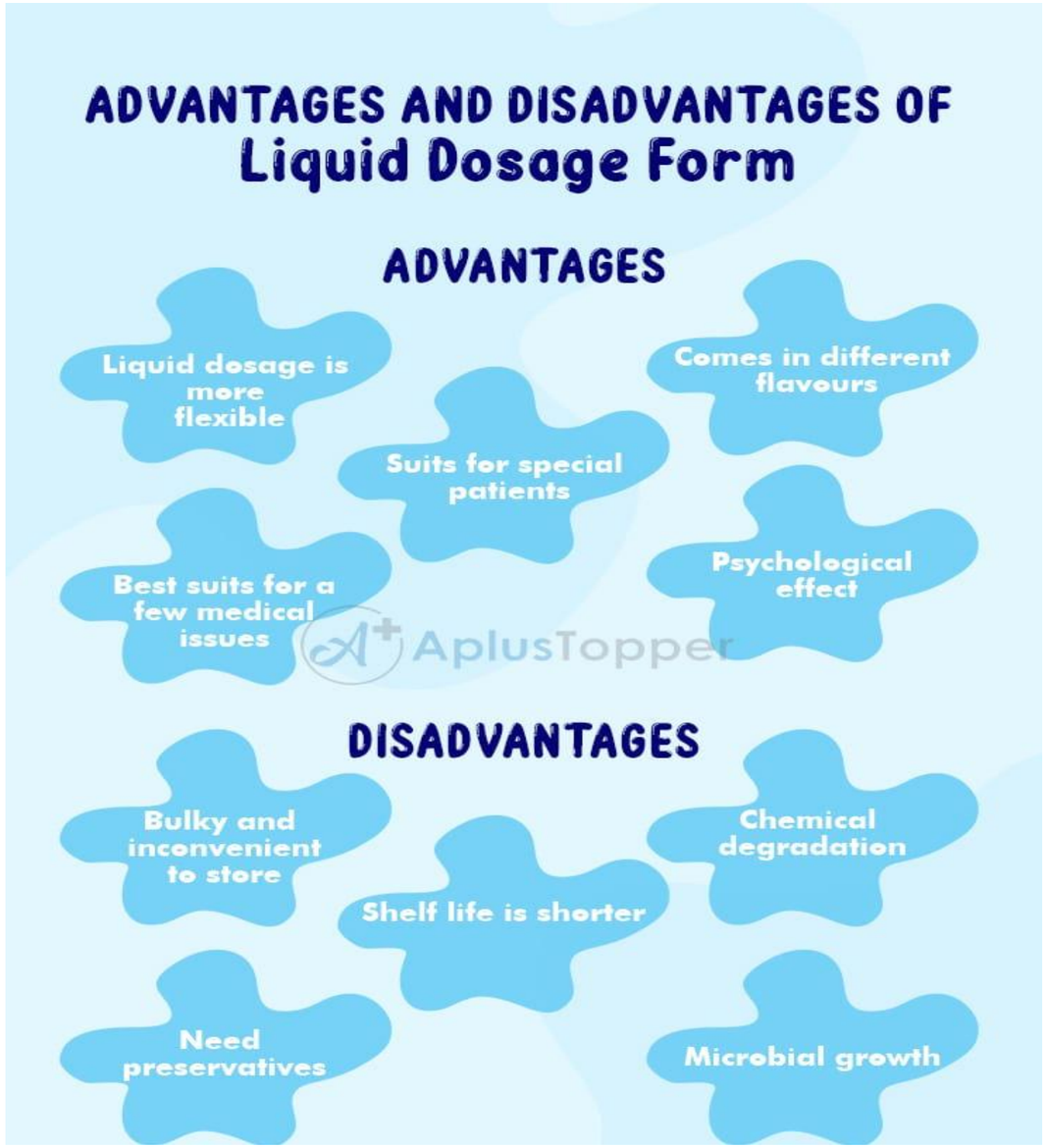
MIND MAP





- LIQUID DOSAGE FORMS
  - MONOPHASIC LIQUID DOSAGE FORMS
    - INTERNAL
      - Syrups, Elixirs
    - EXTERNAL
      - Gargles, Enemas
  - BIPHASIC LIQUID DOSAGE FORMS
    - Suspension, Emulsion

KEY ADVANTAGES OF LIQUID FORMULATIONS



What is a Suspension?

What is a suspension?

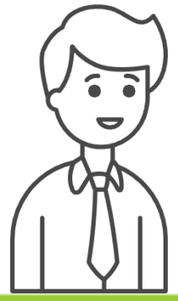
A suspension is a heterogeneous mixture of solid particles dispersed in a liquid, where the particles remain undissolved and visible.

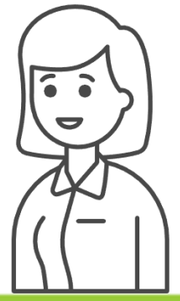
How big are the particles?

Typically larger than 1 micrometer (μm).

What happens over time?

The solid particles settle out due to gravity, a process called sedimentation.





Which type of suspension should be used?

Coarse Suspensions

Suitable for applications where large, visible particles and rapid settling are acceptable.

Colloidal Suspensions

Ideal for applications requiring stability and Brownian motion.

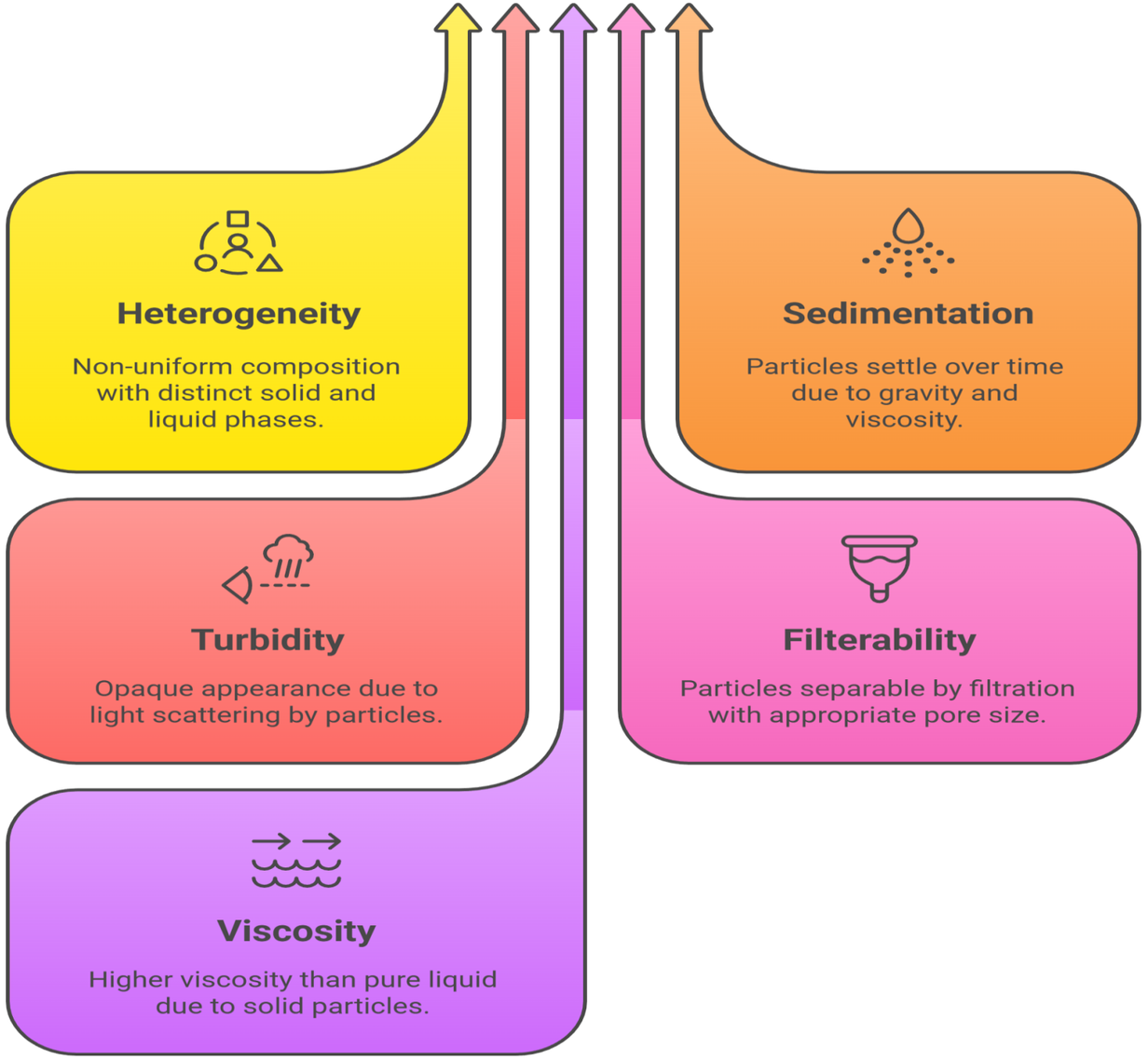
Pharmaceutical Suspensions

Designed for drug delivery, ensuring stability and optimal particle size.

Industrial Suspensions

Used in industrial processes, with viscosity and stability being critical.

Understanding Suspension Characteristics



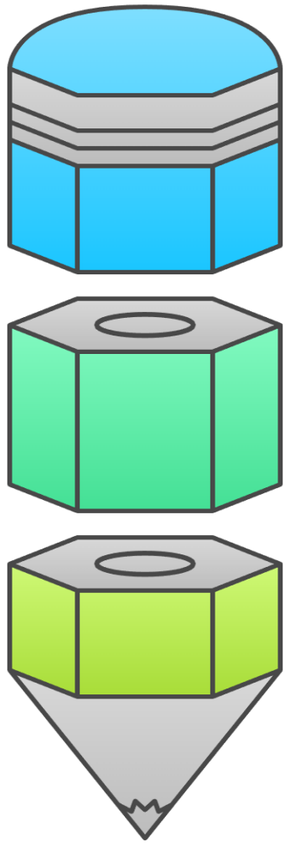
Essential Pharmaceutical Components

Preservatives

Prevent microbial growth and extend shelf life

Antioxidants

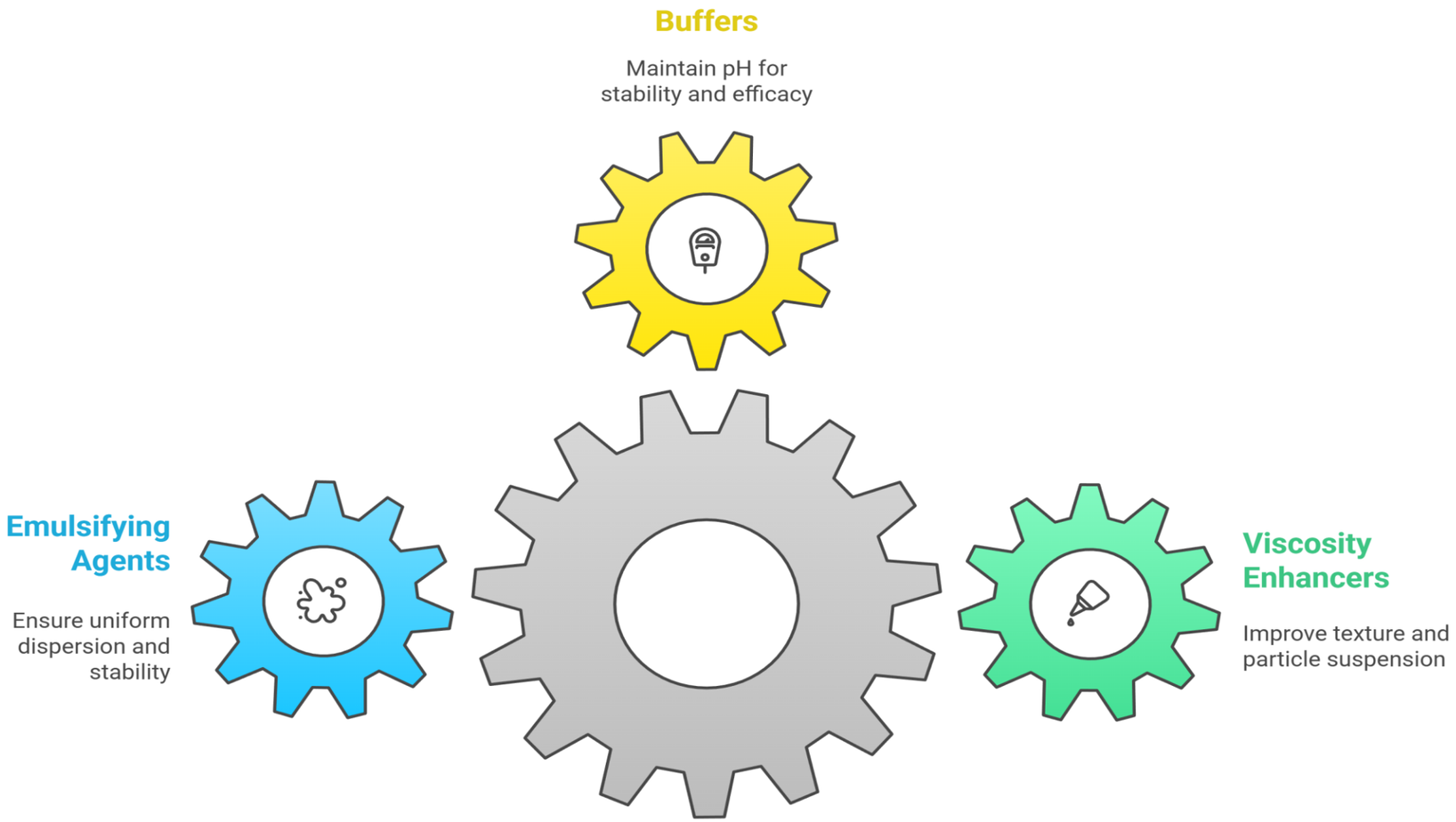
Prevent oxidation and maintain drug integrity



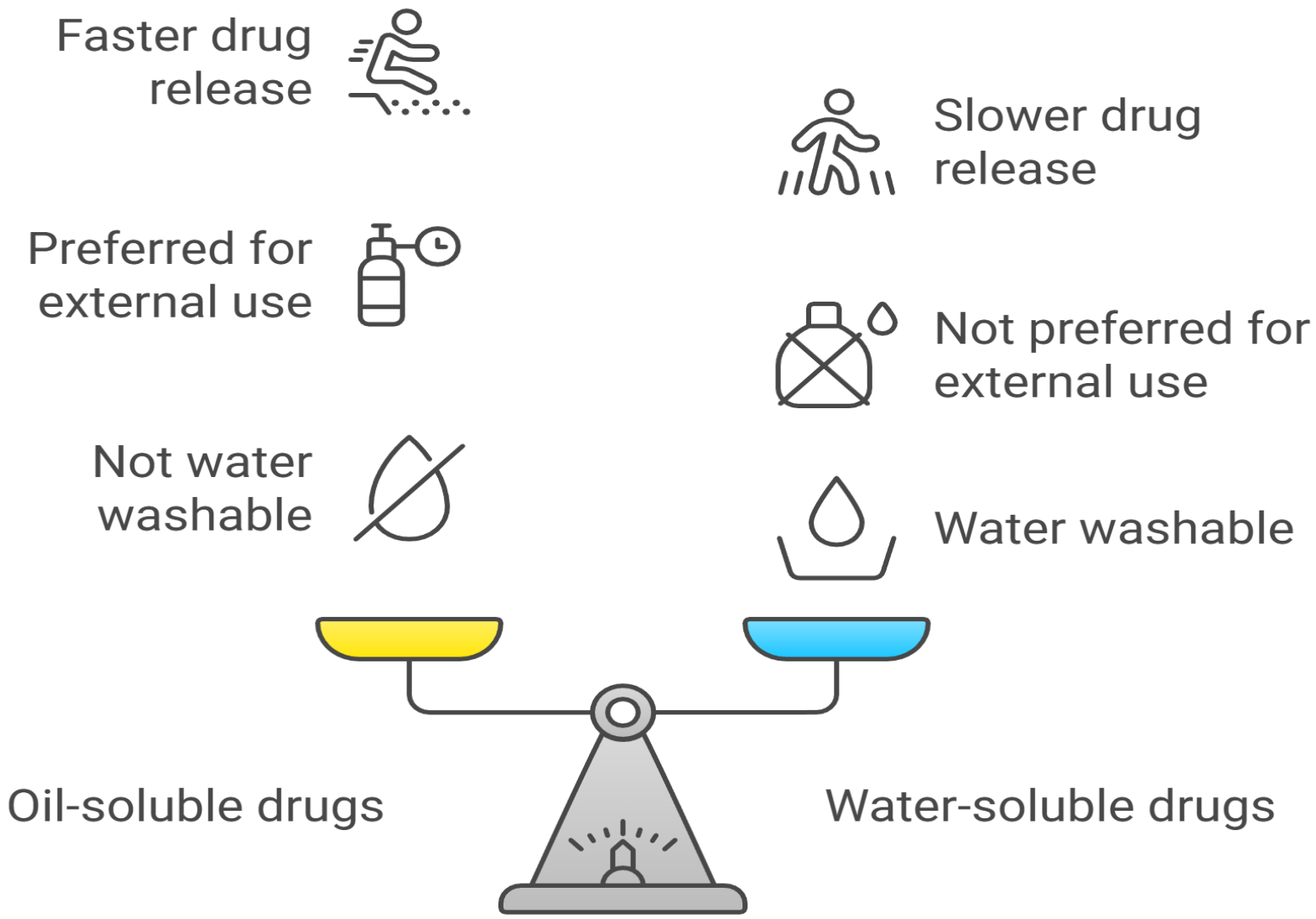
Stabilizers

Protect drugs from degradation and maintain potency

Pharmaceutical Excipient Functions

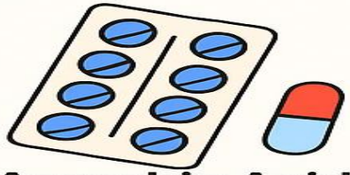


Comparing Drug Release and Washability in SUSPENSIONS



Stabilizers, Viscosity Modifiers & Functional Agents

Stabilizers / Antioxidants



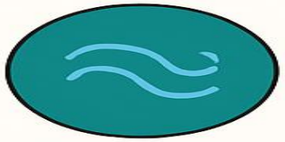
Ascorbic Acid (Vitamin C)

Powerful water-soluble antioxidant that prevents oxidation of active compounds. Effective against phenolic compounds.

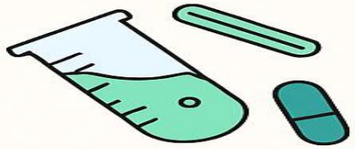
Tween 80

(Hgl valu/e: 1.15%)

HLB value: 15. Typical concentration: 0.1-5%.



Viscosity Enhancers



Hydroxypropyl Methylcellullose

Strong-synthetic polymer that controls viscoscity and act as suspending agents.

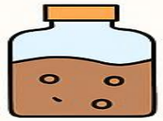
Tween 80 (Polysorbate 80)

HLB value: 15. Typical concentration: 0.1-5%. Maintains pH in range of 3.5--5 for optimal drug stability and solubility.

Emulsifying & Suspending Agents

Acacia & Tragacanth

Natural plant gum that increase viscosity and act as suspending agents. Acacia has a mucoadhesive effect and Tragacant.



Bentonite

Natural clay mineral with excellent suspend-ing properties. Swel-lls in water to form thixotropic gel-like

Applications of Suspensions

Pharmaceuticals

Drugs formulated as suspensions for stability and palatability

Construction Materials

Solid particles in water for workability and setting

Cosmetics

Lotions and makeup with desired viscosity and stability

Paints and Coatings

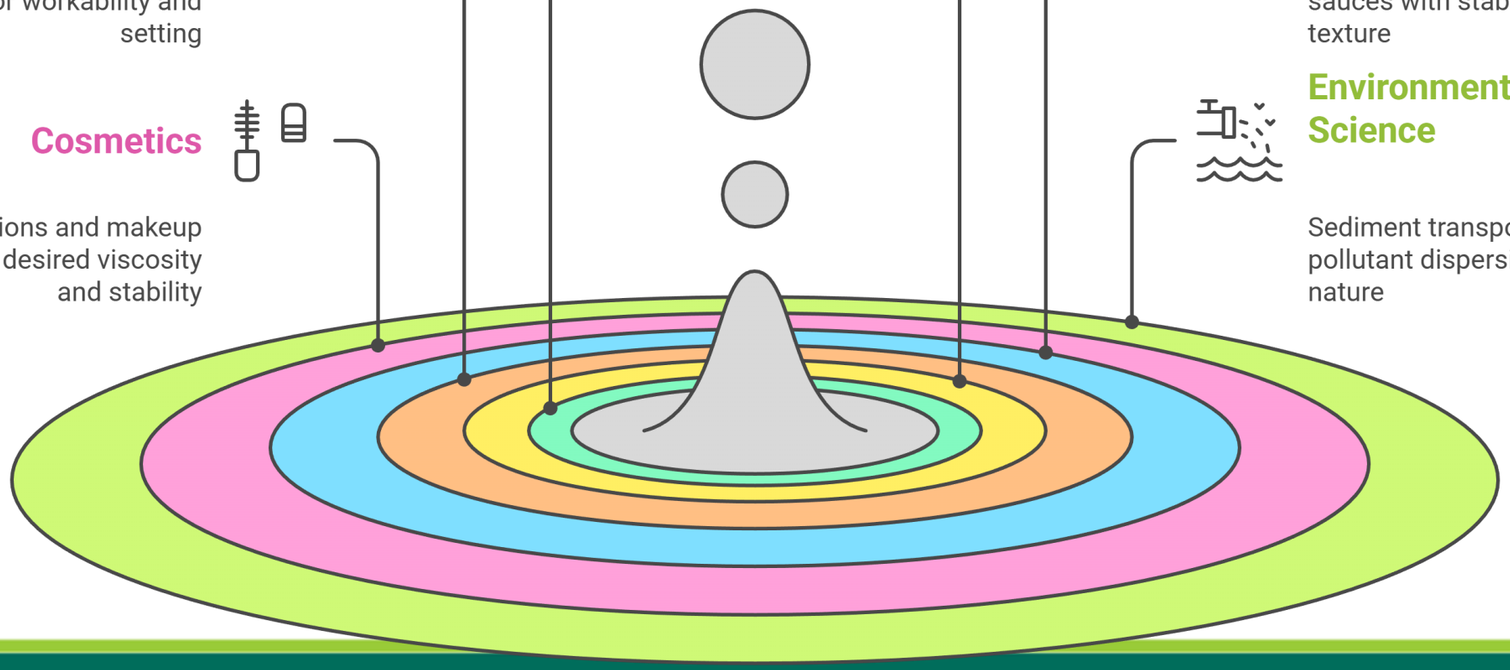
Pigments suspended in liquid for application and performance

Food Industry

Products like milk and sauces with stable texture

Environmental Science

Sediment transport and pollutant dispersion in nature



Factors Affecting Suspension Stability

Particle Size

Smaller particles resist sedimentation better

Viscosity

Higher viscosity slows particle settling

Stabilizing Agents

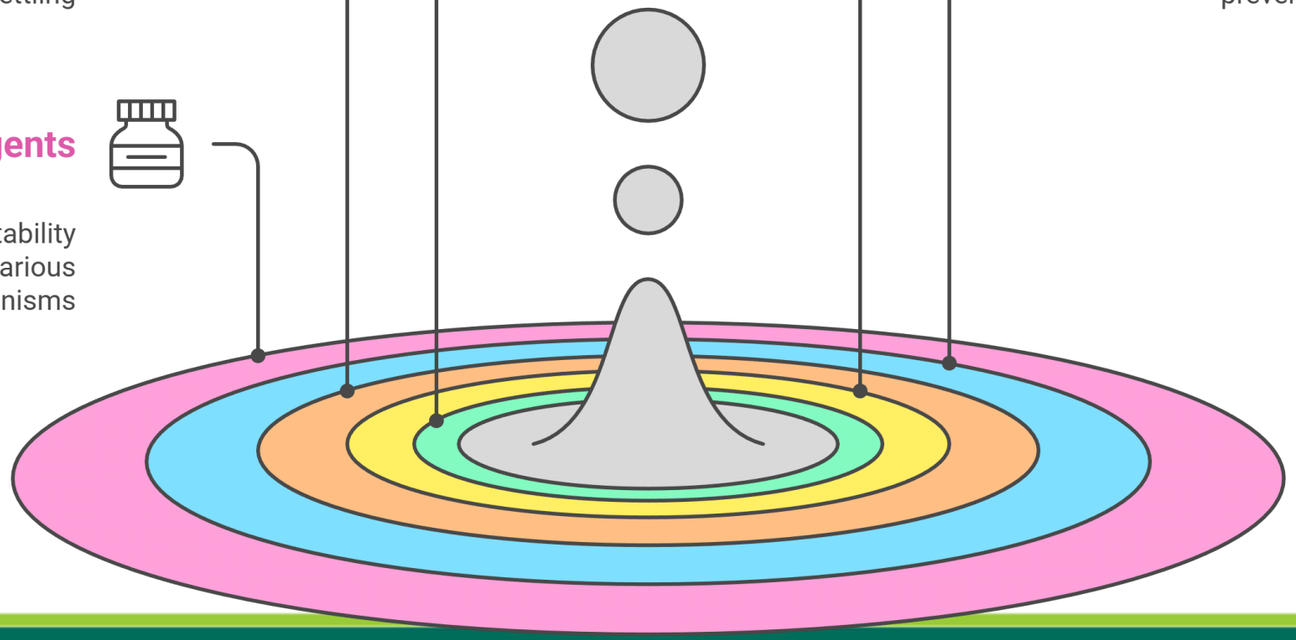
Agents enhance stability through various mechanisms

Density Difference

Minimal density difference slows sedimentation

Surface Charge

Repulsive charges prevent aggregation



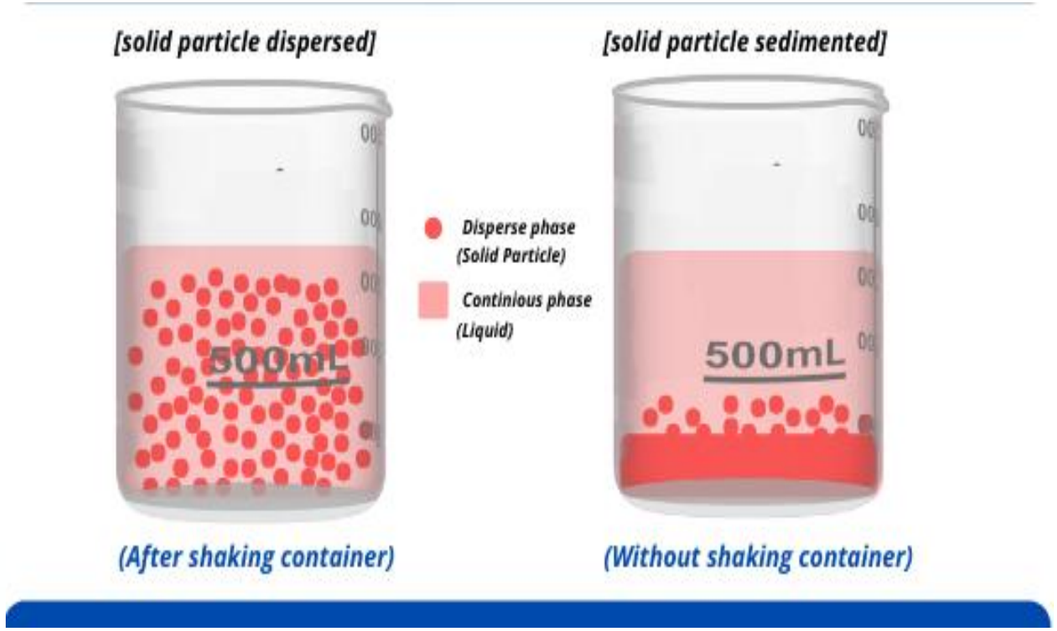
Flow Chart for formulation of Suspension

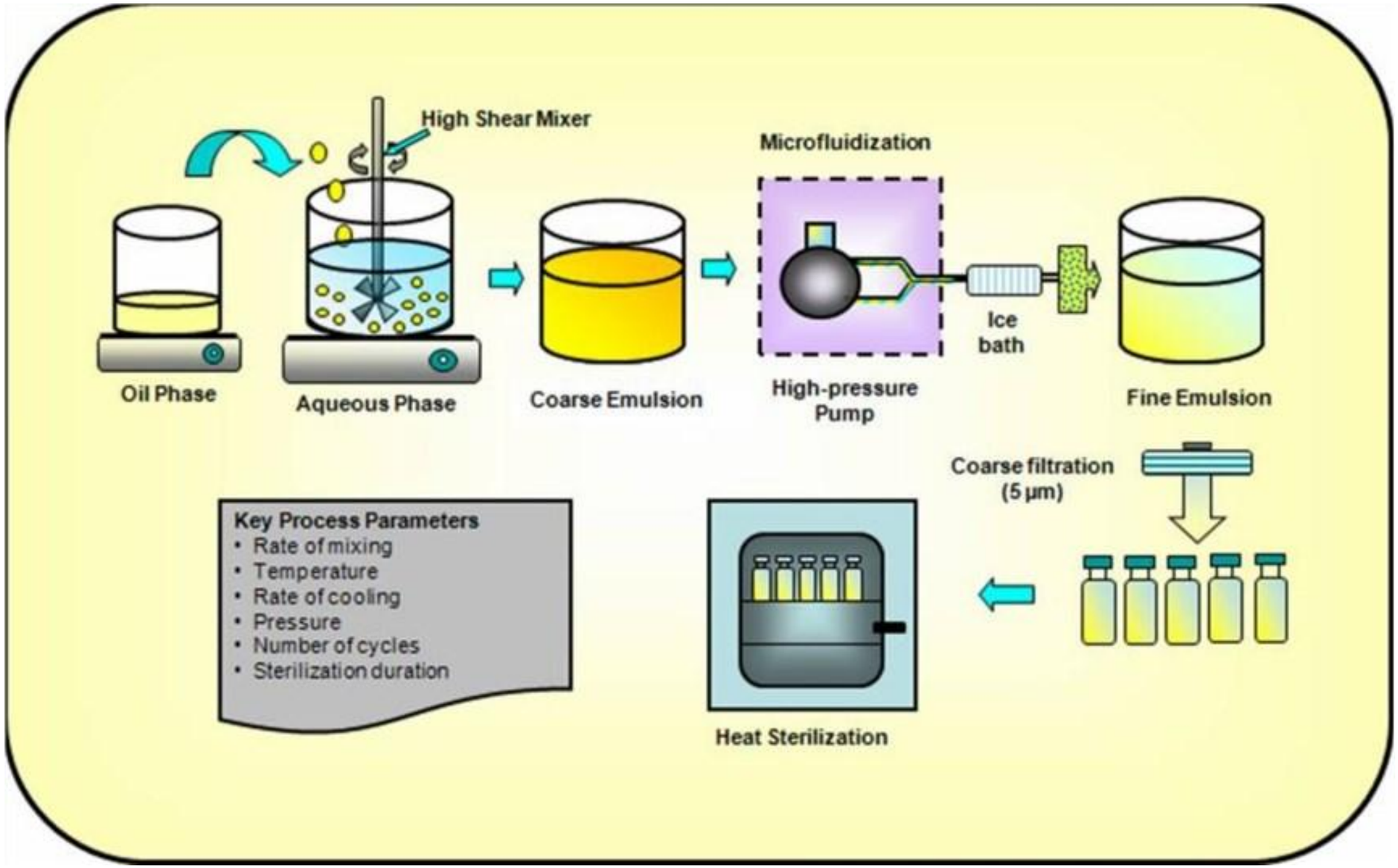
Finely divided particles

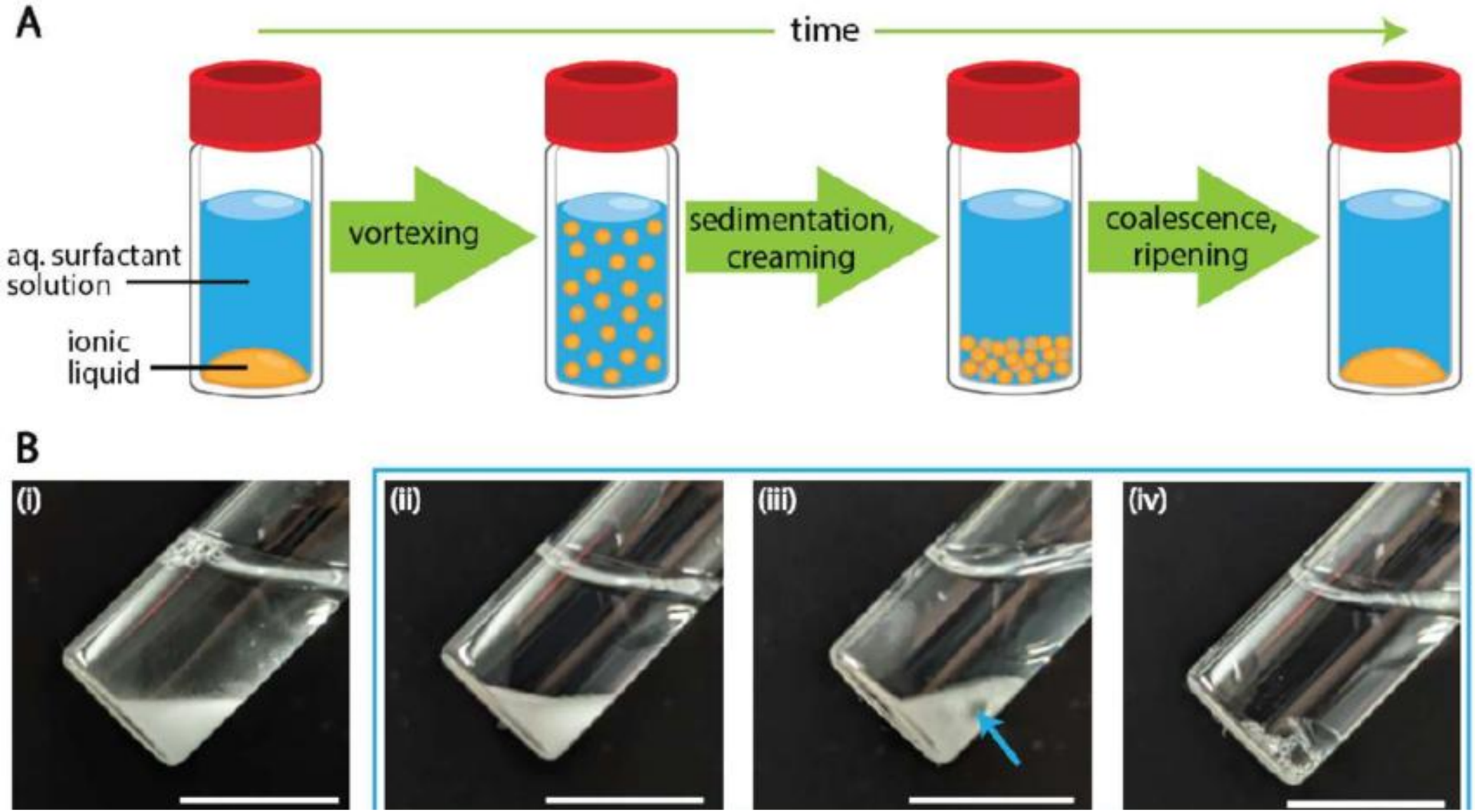
Particles are added in dispersion medium

Wetting agent is added

Deflocculated Suspension




High Shear Mixer
Microfluidization
Oil Phase
Aqueous Phase
Coarse Emulsion
High-pressure Pump
Ice bath
Fine Emulsion
Coarse filtration (5 µm)
Key Process Parameters
• Rate of mixing
• Temperature
• Rate of cooling
• Pressure
• Number of cycles
• Sterilization duration
Heat Sterilization


A
time
aq. surfactant solution
ionic liquid
vortexing
sedimentation, creaming
coalescence, ripening
B
(i)
(ii)
(iii)
(iv)

ASSESSMENT: SUSPENSIONS

1. Define a suspension and list its two primary phases

ASSESSMENT: SUSPENSIONS

2. Differentiate between flocculated and deflocculated Suspensions with one example each.

ASSESSMENT: SUSPENSIONS

3. What is the role of suspending agents? Give two examples.

ASSESSMENT: SUSPENSIONS

4. Explain stability of suspensions. Which of these is reversible?

ASSESSMENT: SUSPENSIONS

5. A patient reports that a topical suspension-based formulation separated after storage. Suggest two methods to improve its stability.

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