# 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 : NOVEL DRUG DELIVERY SYSTEM (BP 706 T)

VII SEM / IV YEAR

UNIT -2

TOPIC 1 :MICROENCAPSULATION

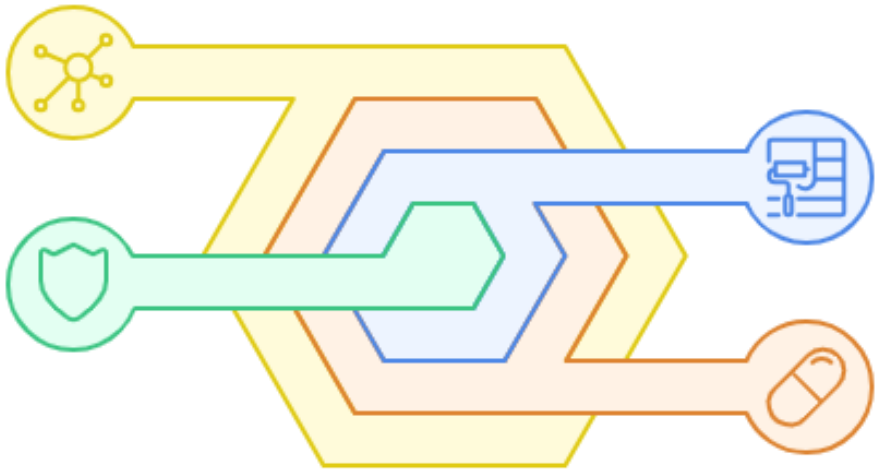
# Microencapsulation

## Microspheres

Matrix structure for controlled diffusion

## Core Material

Encapsulated substance needing protection



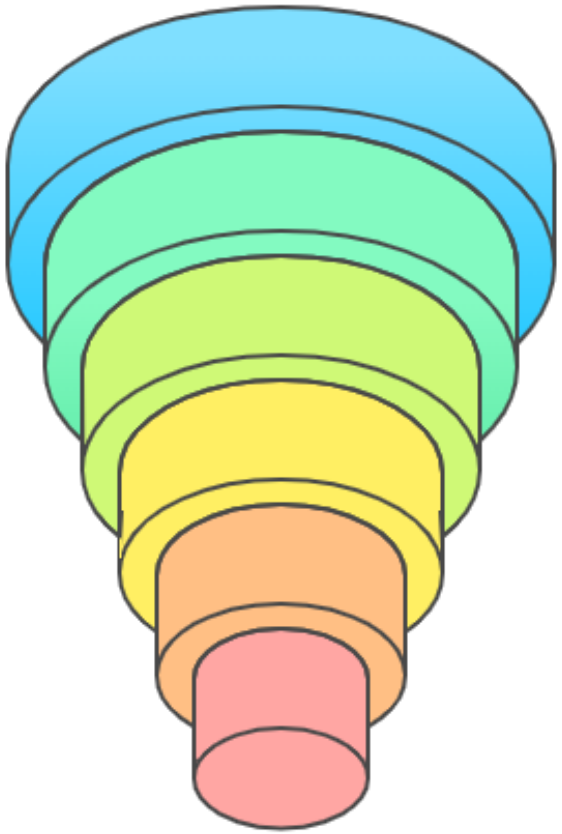
## Coating

Protective layer surrounding the core

## Microcapsules

Core-shell structure for targeted release

# Microencapsulation Advanatages



## Protection

Shielding from environmental factors

## Taste Masking

Hiding unpleasant tastes

## Targeted Delivery

Delivering to specific sites

## Controlled Release

Releasing at specific conditions

## Improved Handling

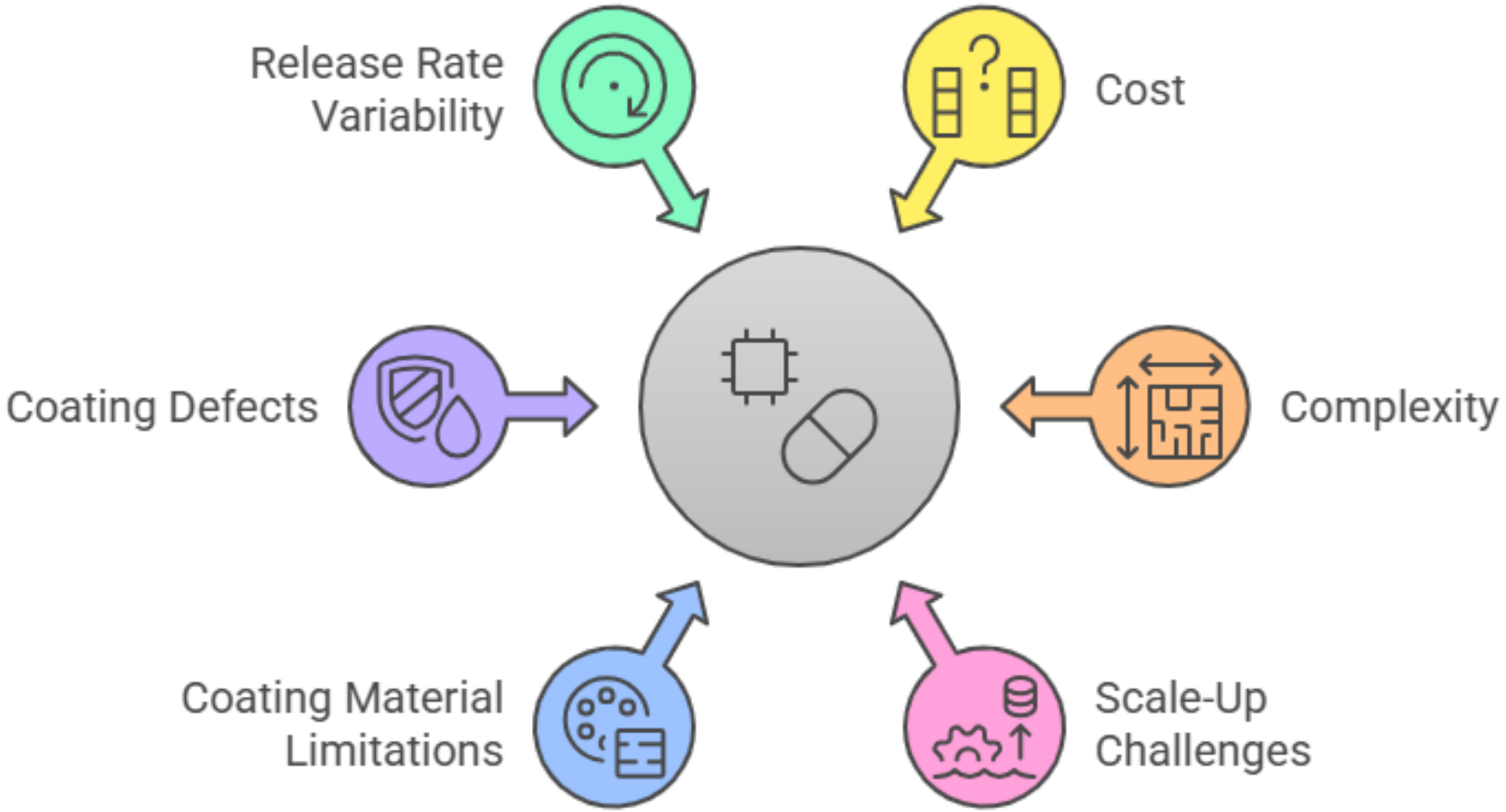
Enhancing ease of use

## Enhanced Stability

Extending shelf life

Made with Napkin

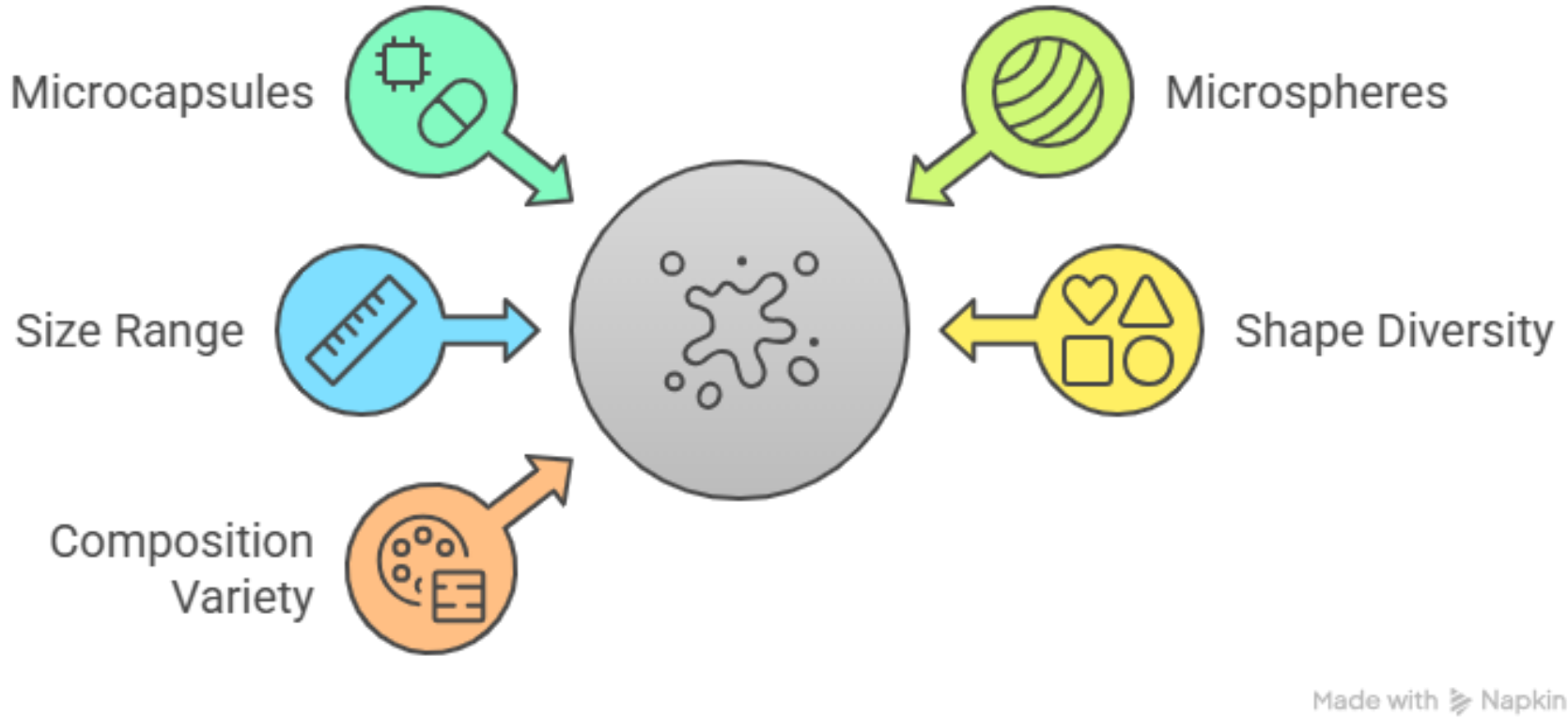
# Disadvantages of Microencapsulation



# Microcapsules vs. Microspheres

| Characteristic | Structure | Core Material | Protection | Release Control | Production |
|---|---|---|---|---|---|
| Microcapsules | Core-shell | Solid, liquid, or gas | Better | More precise | More complex |
| Microspheres | Matrix | Solid or liquid | Less | Less precise | Simpler |

# Understanding Microparticles



# microencapsulation method

## Emulsion Polymerization

Forms stable emulsions, good for water-soluble materials, but requires careful control of reaction conditions.

## Extrusion

Simple process, good for viscous materials, but may produce larger particles.

## Coacervation

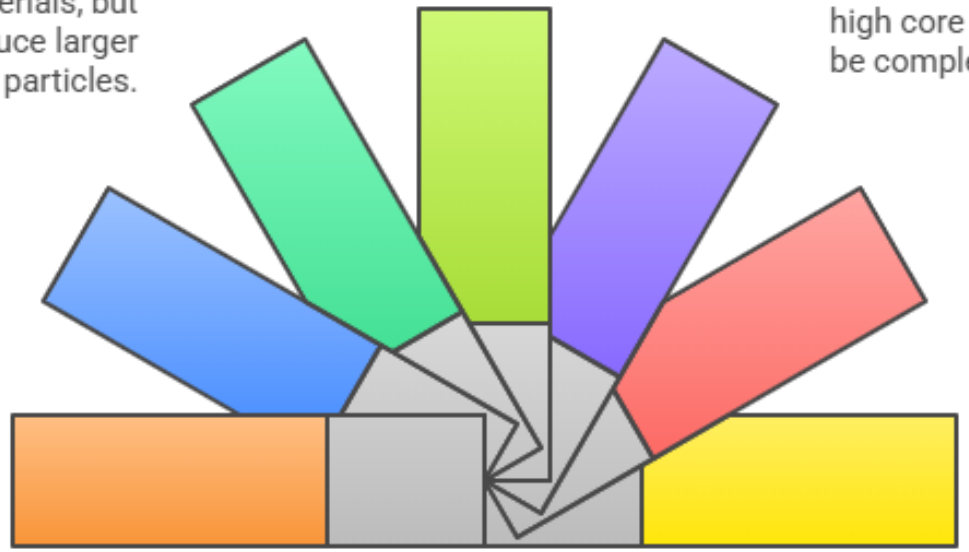
Forms microcapsules with high core loading, but can be complex to control.

## Fluid Bed Coating

Provides uniform coating, good for large-scale production, but requires specialized equipment.

## Interfacial Polymerization

Creates thin, uniform coatings, but requires immiscible liquids.

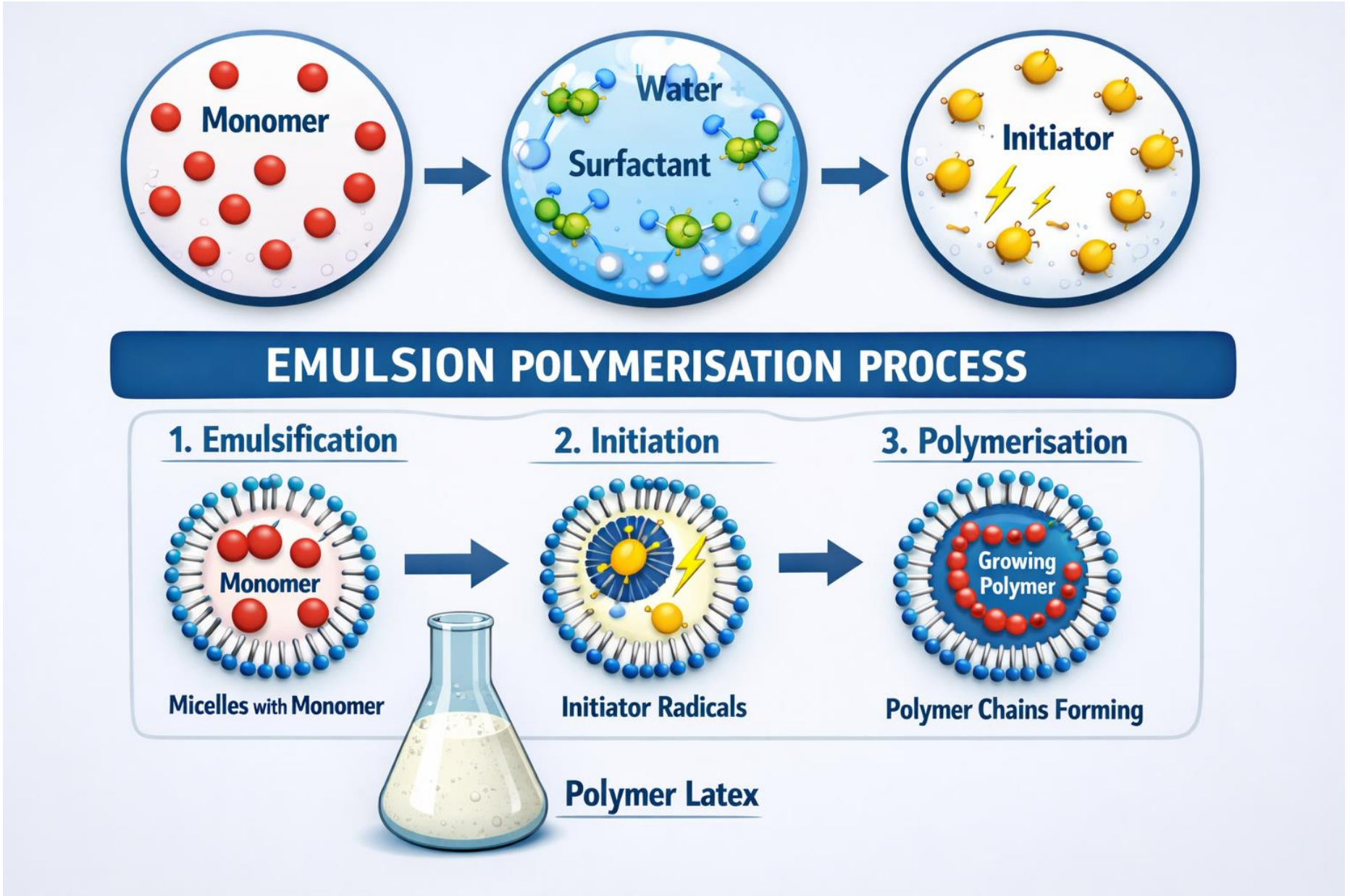


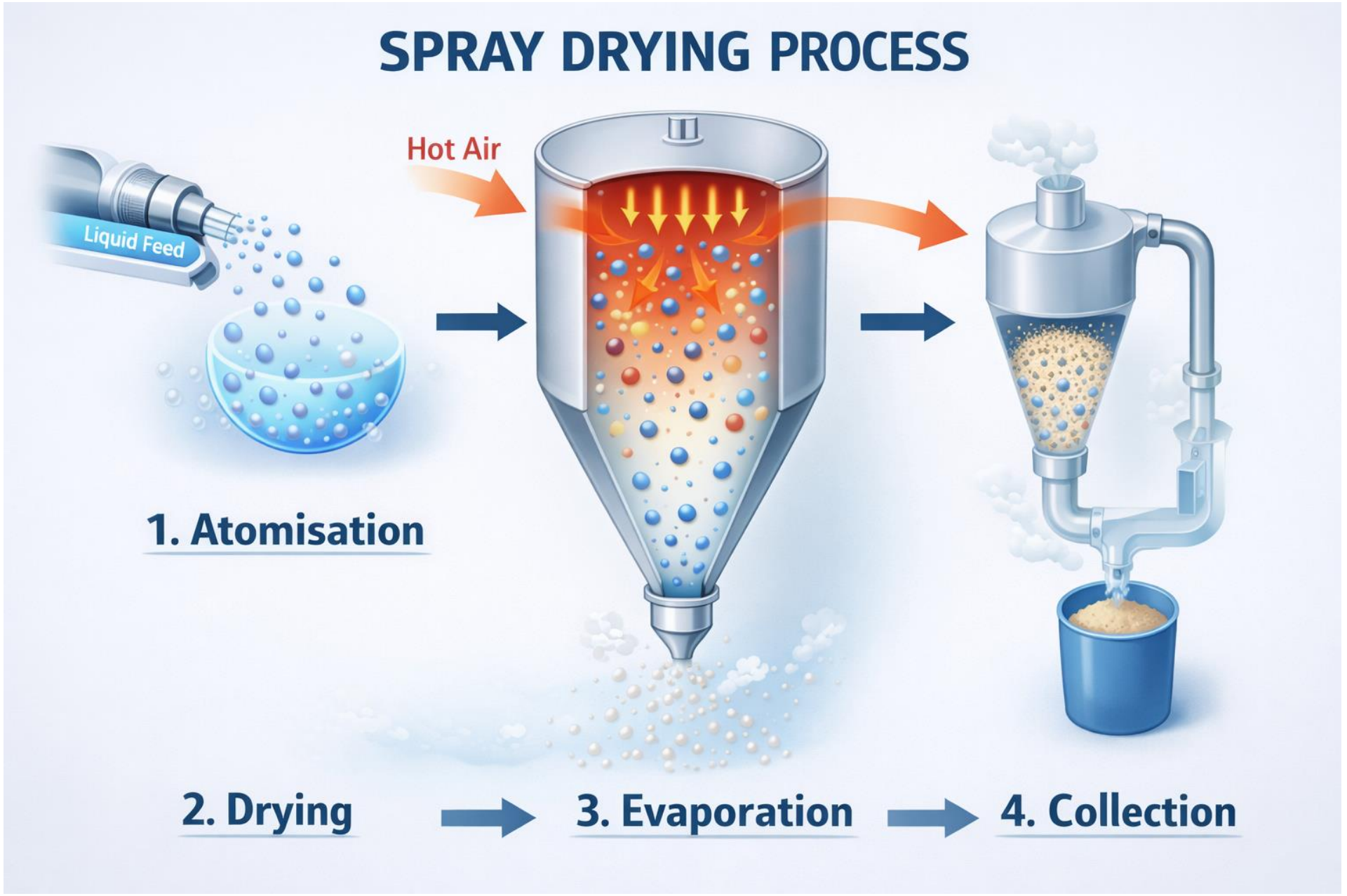
## Spray Drying

Suitable for heat-stable materials, cost-effective, but may result in irregular particle shapes.

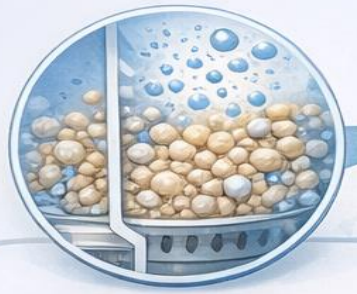
## Solvent Evaporation

Simple process, good for volatile solvents, but may leave solvent residues.


Monomer
Water
Surfactant
Initiator
EMULSION POLYMERISATION PROCESS
1. Emulsification
2. Initiation
3. Polymerisation
Monomer
Growing Polymer
Micelles with Monomer
Initiator Radicals
Polymer Chains Forming
Polymer Latex


SPRAY DRYING PROCESS
Hot Air
Liquid Feed
1. Atomisation
2. Drying
3. Evaporation
4. Collection

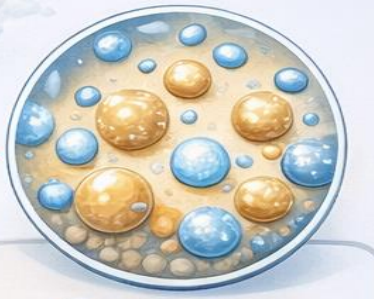
# FLUID BED COATING



Coating Solution

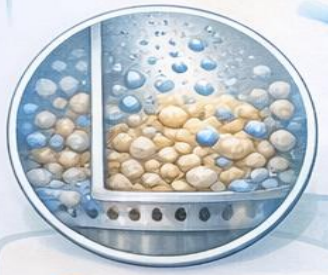
Hot Air

Exhaust Air



## ① Fluidization

- Hot air is passed through a perforated plate to fluidize the particles.



## ② Spraying

## ③ Coating



## ③ Coating

## Applications

- Pharmaceuticals
- Food & Nutraceuticals
- Agriculture
- Chemicals

## Advantages

- Uniform Coating
- Efficient and Fast
- Controlled Release
- Improved Stability

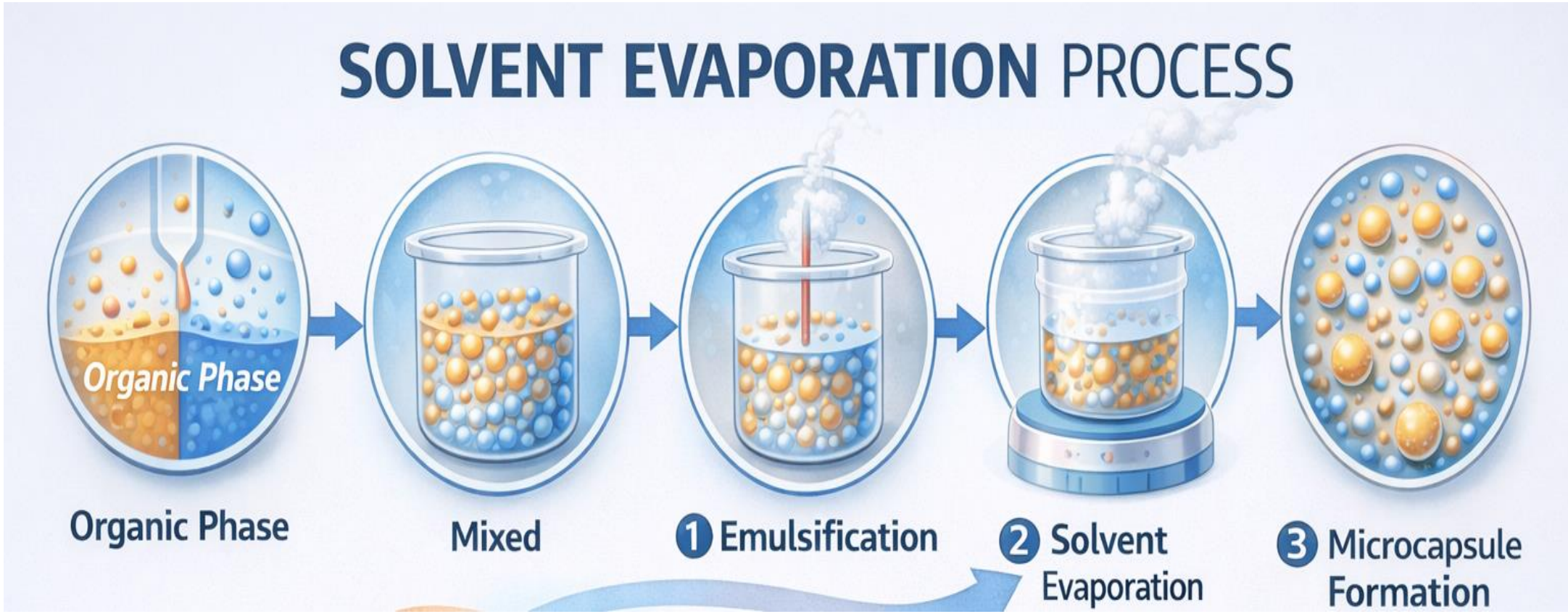
## Applications

Pharmaceuticals

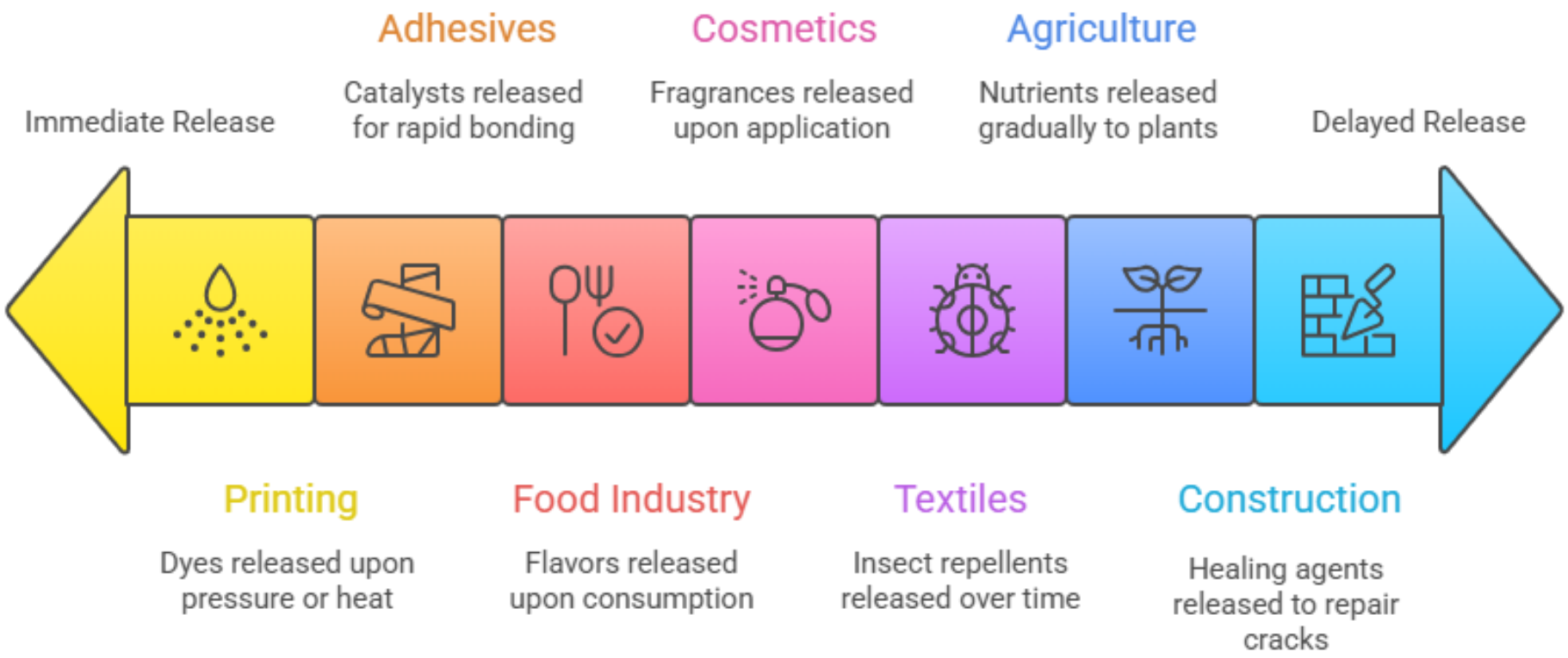
Food & Nutraceuticals

Agriculture

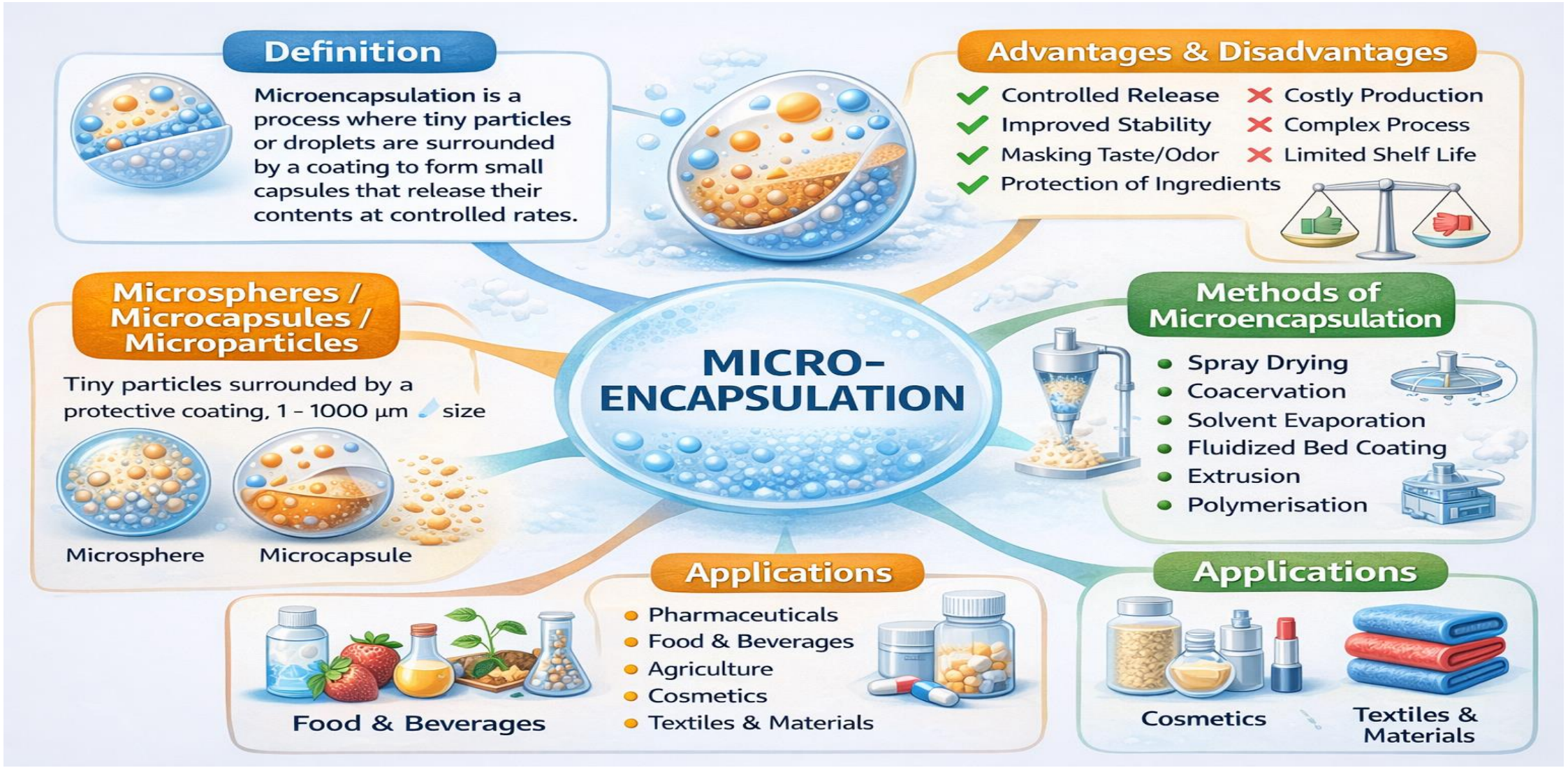
Chemicals


SOLVENT EVAPORATION PROCESS
Organic Phase
Organic Phase
Mixed
1 Emulsification
2 Solvent Evaporation
3 Microcapsule Formation

# Microencapsulation Application.



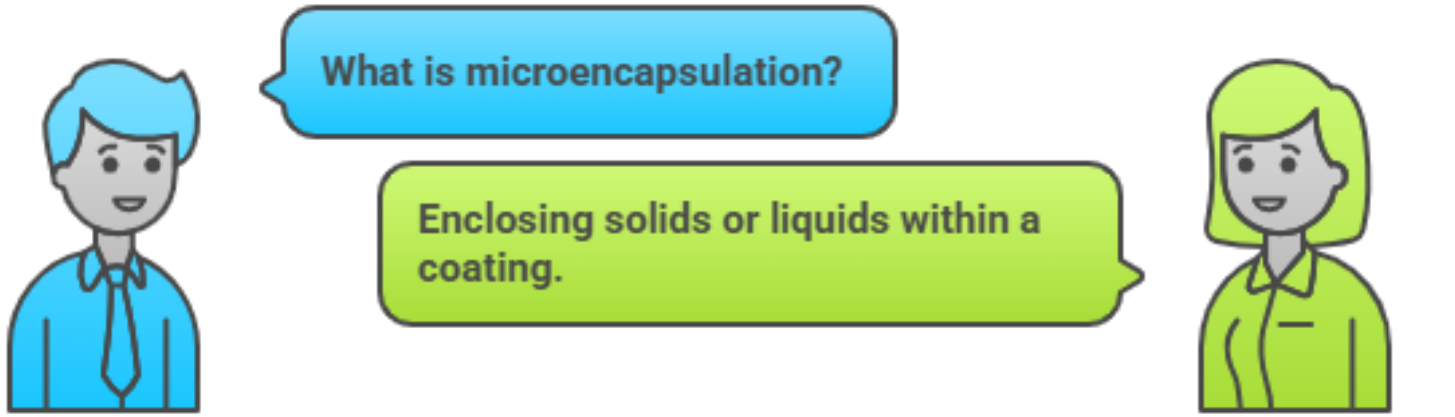
# SUMMARY


MICRO-ENCAPSULATION
Definition
Microencapsulation is a process where tiny particles or droplets are surrounded by a coating to form small capsules that release their contents at controlled rates.
Advantages & Disadvantages
Controlled Release
Improved Stability
Masking Taste/Odor
Protection of Ingredients
Costly Production
Complex Process
Limited Shelf Life
Microspheres / Microcapsules / Microparticles
Tiny particles surrounded by a protective coating, 1 – 1000 µm size
Microsphere
Microcapsule
Methods of Microencapsulation
Spray Drying
Coacervation
Solvent Evaporation
Fluidized Bed Coating
Extrusion
Polymerisation
Applications
Food & Beverages
Pharmaceuticals
Food & Beverages
Agriculture
Cosmetics
Textiles & Materials
Applications
Cosmetics
Textiles & Materials

# ASSESMENTS

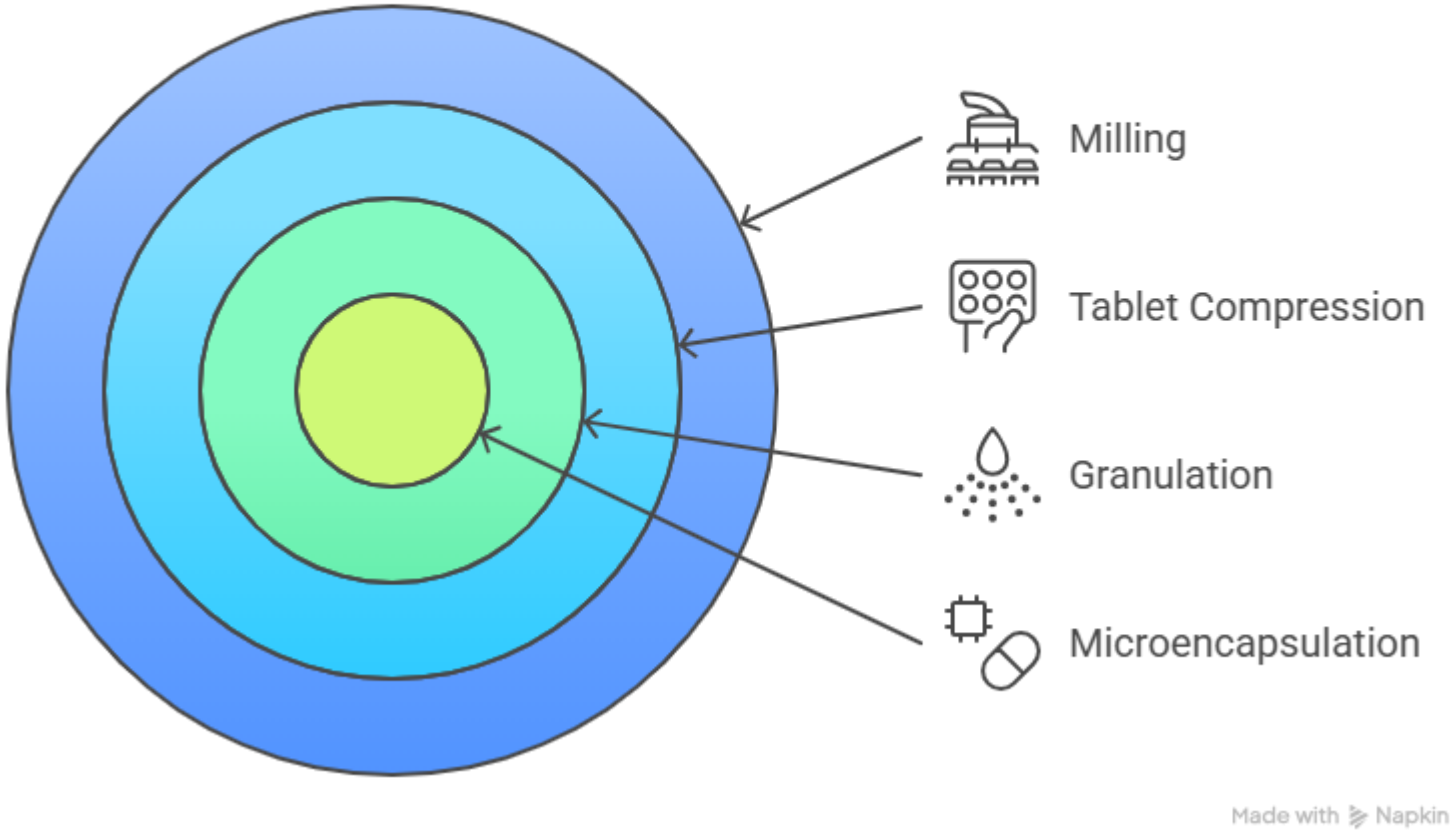
1. Microencapsulation is best defined as

# Microencapsulation Definition



2. Taste masking is achieved mainly by

# Taste Masking Techniques



The material to be encapsulated is called

# Components of a Core Structure

### Plasticizer

Enhances flexibility and workability

### Coating Material

Protects and insulates the core

### Solvent

Dissolves other substances for mixing

### Surfactant

Reduces surface tension for better mixing

# REFERENCES


1. Yie W. Chien: Novel Drug Delivery Systems, Second Edition, Marcel Dekker, Inc, 1992 Pg no.816.

2. Joseph R. Robinson: Sustained and Controlled Release Drug Delivery Systems, First edition, Volume 6, Marcel Dekker, Inc,1986,pg.618.

3. https://www.sciencedirect.com/journal/journal-of-controlled-release

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5. https://www.scribd.com/document/668313752/Controlled-and-Novel-Drug-Delivery-by-N-K-Jain-1st-Editn-Reprint

# THANK YOU


## MICROENCAPSULATION

**Advantages**

- Controlled Release
- Protection of Ingredients