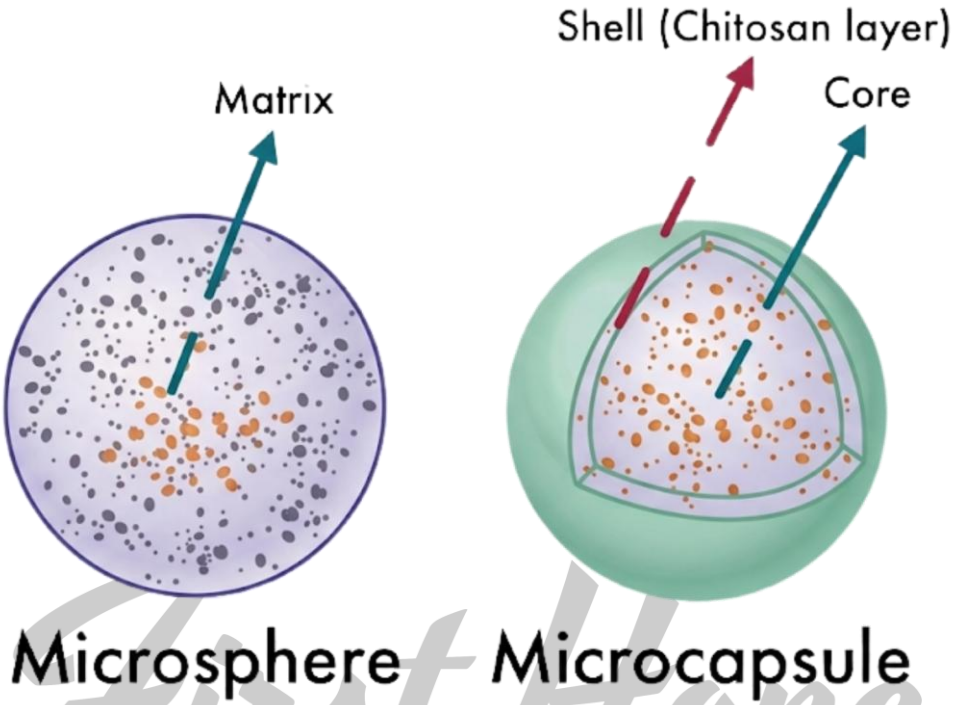
Micro Capsules / Micro Spheres

Microcapsules / Microspheres

- These are tiny particles used to carry drugs.
- Their size usually ranges from a few micrometers (μm) to a few hundred micrometers.



First Hope

Difference between Microcapsules and Microspheres

- **Microcapsules**:
  - Have a core-shell structure.
  - The drug is inside a central core, and it is surrounded by a coating (polymer membrane).
- **Microspheres**:
  - The drug is uniformly distributed throughout the particle.
  - There is no separate core and shell.

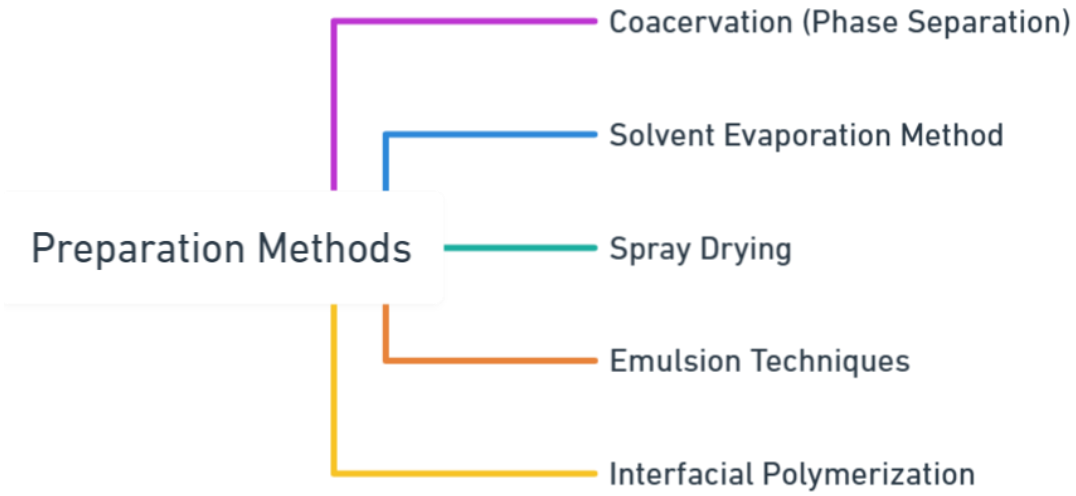
Types

1. **Based on structure:**
   - **Reservoir type (Microcapsules)** – Drug in the center, surrounded by coating.
   - **Matrix type (Microspheres)** – Drug dispersed throughout the polymer matrix.
2. **Based on material used:**
   - Natural polymers (gelatin, alginate, chitosan)
   - Synthetic polymers (PLA, PLGA, polyacrylates)
3. **Based on release behavior:**

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

- Sustained release (slow drug release over time)
- Controlled release (precise control of release rate)
- Targeted delivery (drug released at a specific site)

Preparation Methods



1. Coacervation (Phase Separation)

- Polymer is dissolved in a solution.
- Drug is added.
- Another substance is added to reduce solubility of polymer → polymer separates and coats the drug.
- Used for proteins and sensitive drugs.

2. Solvent Evaporation Method

- Polymer and drug dissolved in volatile solvent.
- This mixture is added to another liquid (like water).
- Solvent evaporates → solid microspheres form.
- Common for hydrophobic drugs.

3. Spray Drying

- Drug + polymer solution is sprayed into hot air.
- Droplets quickly dry and form particles.
- Fast and widely used.

4. Emulsion Techniques

- Oil-in-water or water-in-oil emulsions are formed.
- Polymer solidifies around drug droplets.

5. Interfacial Polymerization

- Two reactive monomers at interface form a polymer coating around drug.

First Hope

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

Evaluation

A. Particle Size and Shape

- Measured using microscopy or particle size analyzer.

B. Surface Morphology

- Studied by scanning electron microscope (SEM).

C. Drug Content and Entrapment Efficiency

- Measures how much drug is actually present inside particles.

D. In-vitro Drug Release

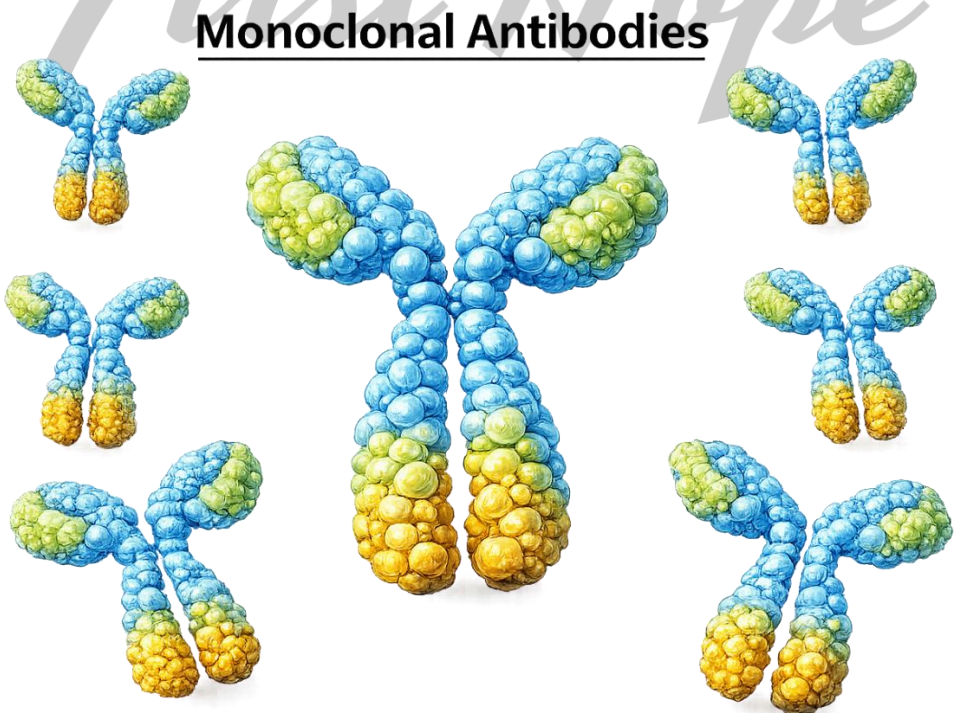
- Determines how drug is released over time.

E. Stability Studies

- Checks how formulation behaves over time (temperature, humidity).

Monoclonal Antibodies

- These are antibodies that are identical and produced from a single type of immune cell.
- They recognize and bind to a specific antigen.



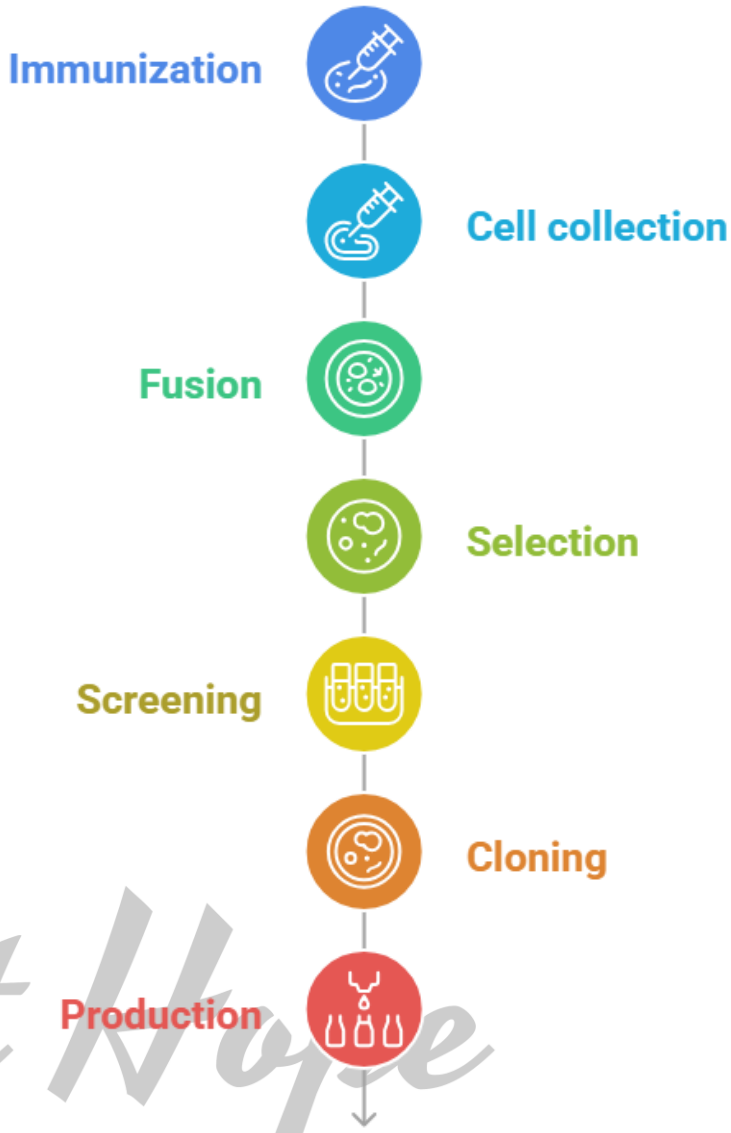
Preparation (Hybridoma technology)

1. Immunization

- Animal (usually mouse) is injected with antigen
- Immune system produces B-cells that make antibodies

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

2. **Cell collection**
   - Spleen cells (B-cells) are collected
3. **Fusion**
   - B-cells are fused with myeloma (cancer) cells
   - This creates hybrid cells called hybridomas
   - These cells can both grow continuously and produce antibodies
4. **Selection**
   - Only fused cells survive in selective medium
5. **Screening**
   - Hybridomas are tested for desired antibody production
6. **Cloning**
   - Selected hybridomas are cloned to produce identical cells
7. **Production**
   - Large-scale production of monoclonal antibodies



First Hope

Applications

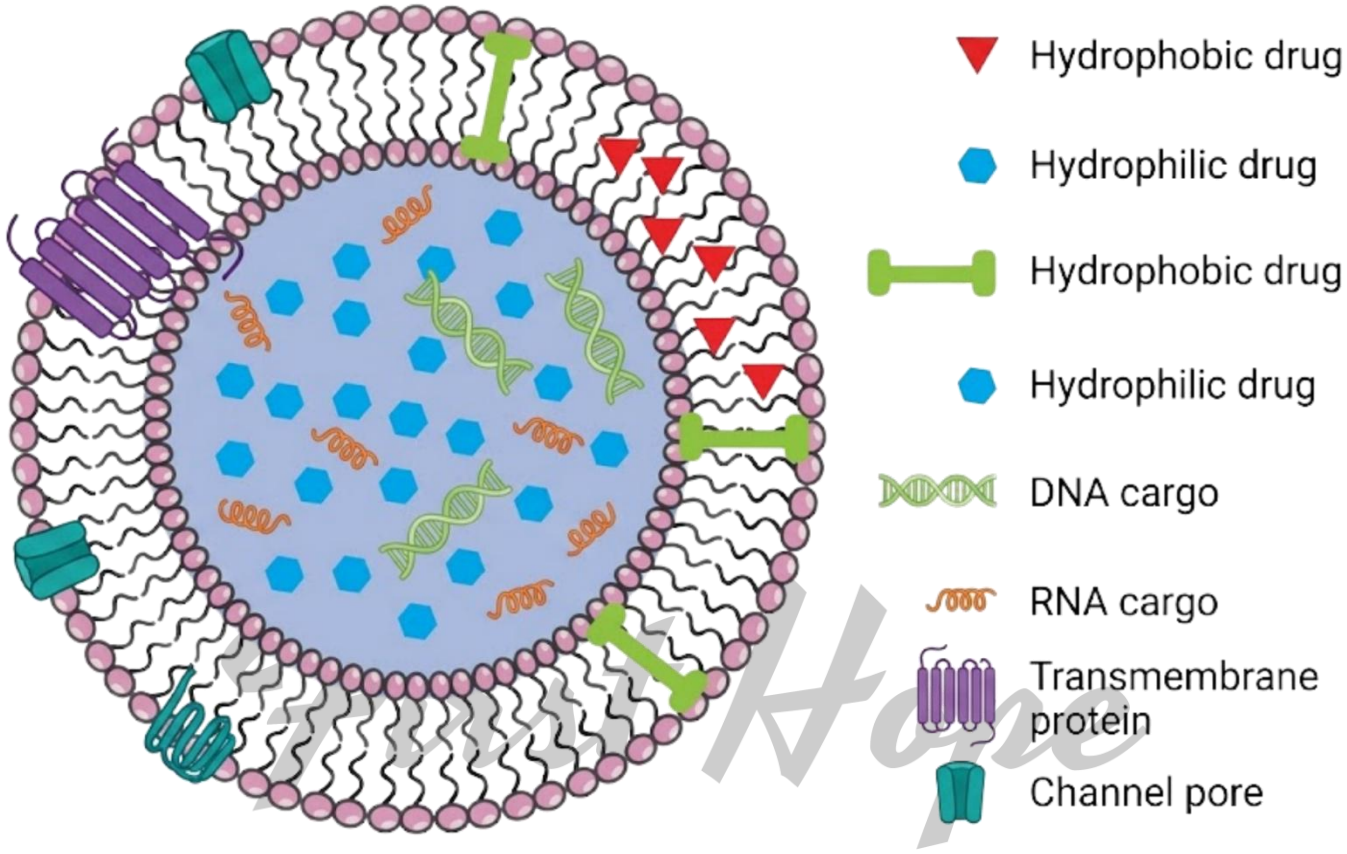
1. **Cancer Treatment**
   - Target cancer cells specifically (e.g., trastuzumab).
2. **Autoimmune Diseases**
   - Used in rheumatoid arthritis, psoriasis.
3. **Diagnostic Tools**
   - Used in pregnancy tests, ELISA tests.
4. **Targeted Drug Delivery**
   - Deliver drugs directly to diseased cells.
5. **Infectious Diseases**
   - Used in viral infections (e.g., COVID-19 therapies).

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

Niosomes

Basic idea

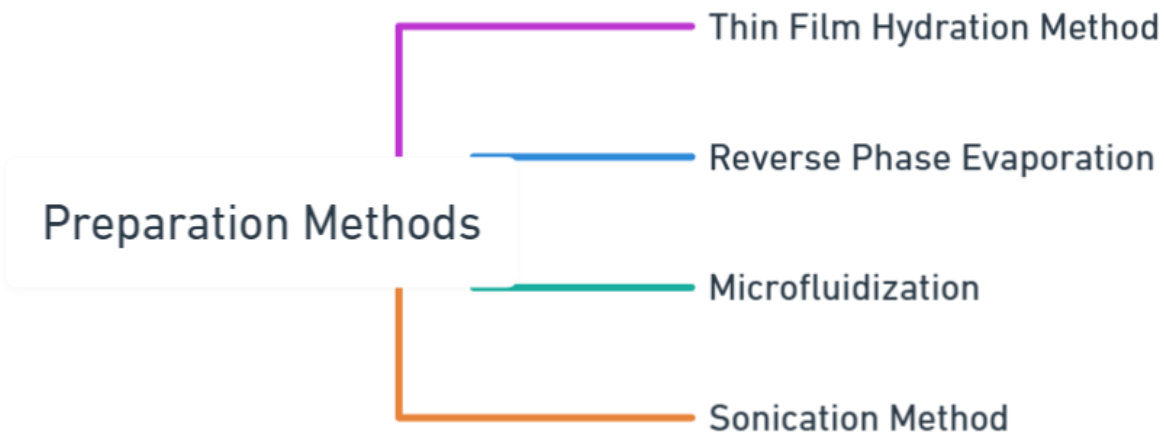
- Niosomes are vesicles formed from non-ionic surfactants and cholesterol.
- They are similar to liposomes but more stable and cheaper.



Structure

- Bilayer structure
- Hydrophilic drugs are trapped inside the aqueous core
- Lipophilic drugs are embedded in the bilayer

Preparation Methods



1. Thin Film Hydration Method

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

First Hope

FREE PREVIEW

Click here to visit our website

PHARMACY PREMIUM NOTES

Complete subject and semesters are available on FirstHope app only.

Scan or click here

Click here to get the app >

Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram >

Scan or click here

@FirstHopeNotes

Instagram

@firsthope.official

Click here to follow >

YouTube channel

FirstHope-Pharmacy / Live streams

Click here to watch >

WhatsApp channel

Follow FirstHope on WhatsApp

Click here to join >

FirstHope website

firsthope.co.in

Click here to visit >

B.Pharm / D.Pharm / M.Pharm / Pharm.D

Preview notes. Complete subjects and semesters in the FirstHope app.