



NANOCAPSULES

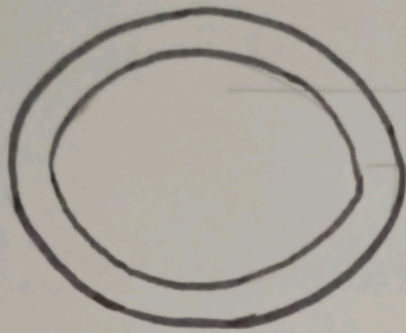
Nano Capsules are vesicular system in which the drug is confined to a cavity consisting of an inner liquid core surrounded by a polymeric membrane. The diameter of the drug particles should be in range of 250 - 500 nm.

They are colloidal nano-bubbles in which the core (oily or aqueous) is surrounded by a polymeric membrane with specific properties.

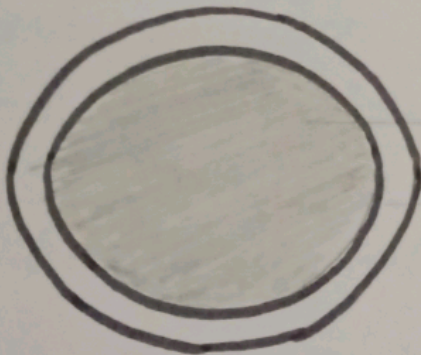
It is a characteristic class of nanoparticles, are made up of one or more active materials (core), and a protective matrix (shell) in which the therapeutic substance may be confined.

Nano Capsules have been developed as drug delivery systems for several drugs by different routes of administrations such as oral and parental with pH range of 3.0 - 7.5

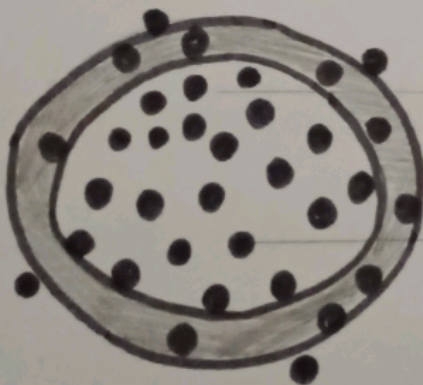
STRUCTRE



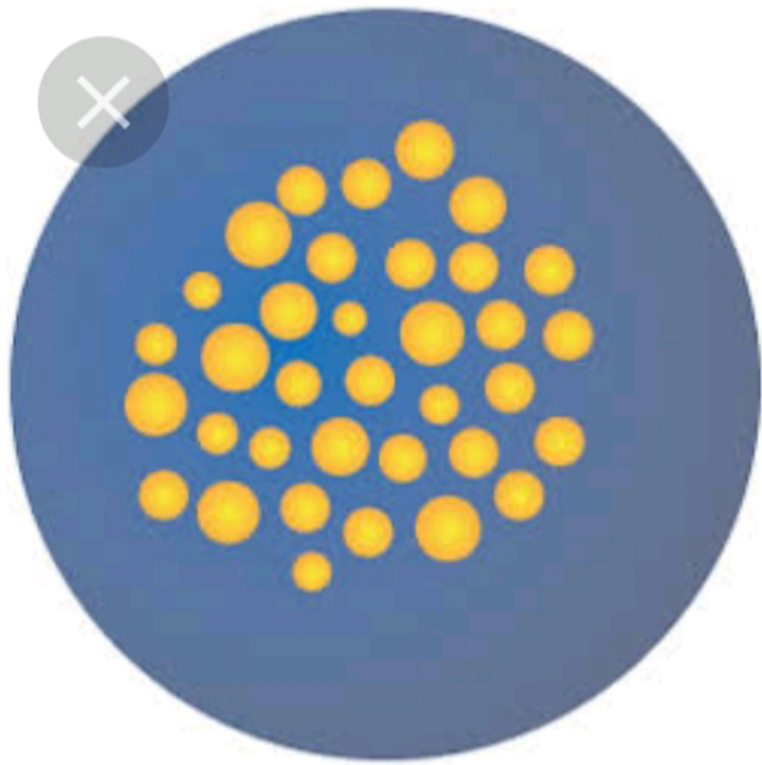
Liquid core
polymeric membrane



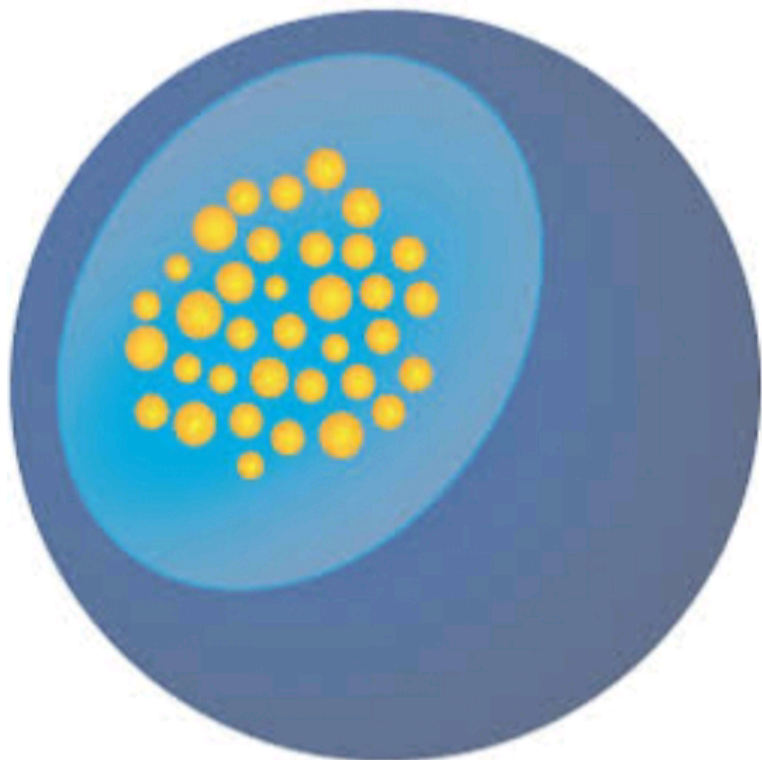
polymer matrix
polymeric membrane



Liquid Core
polymeric membrane
Active substance in
molecular state.



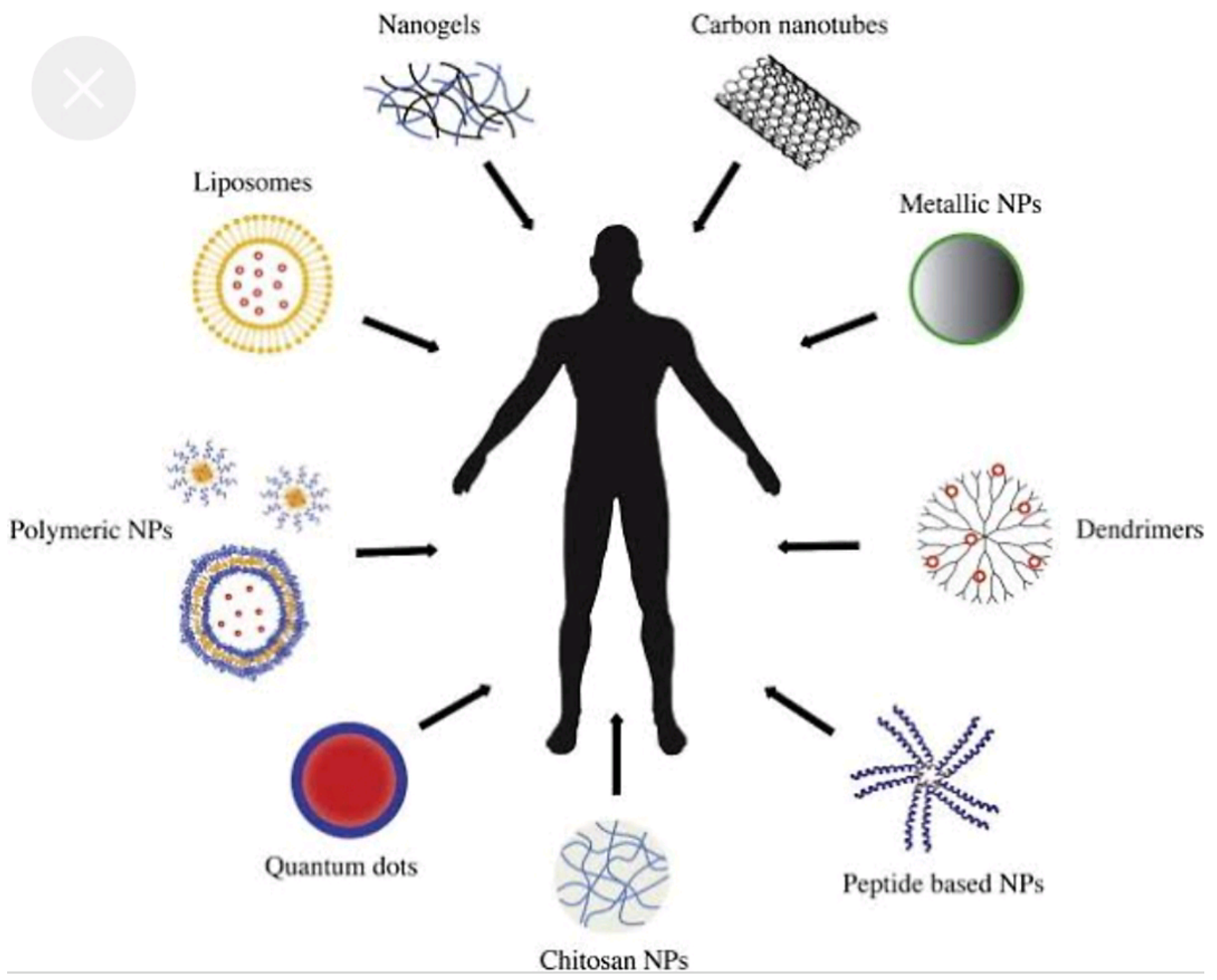
Nanospheres
(matrix system)



Nanocapsules
(reservoir system)

ADVANTAGES of nanocapsules

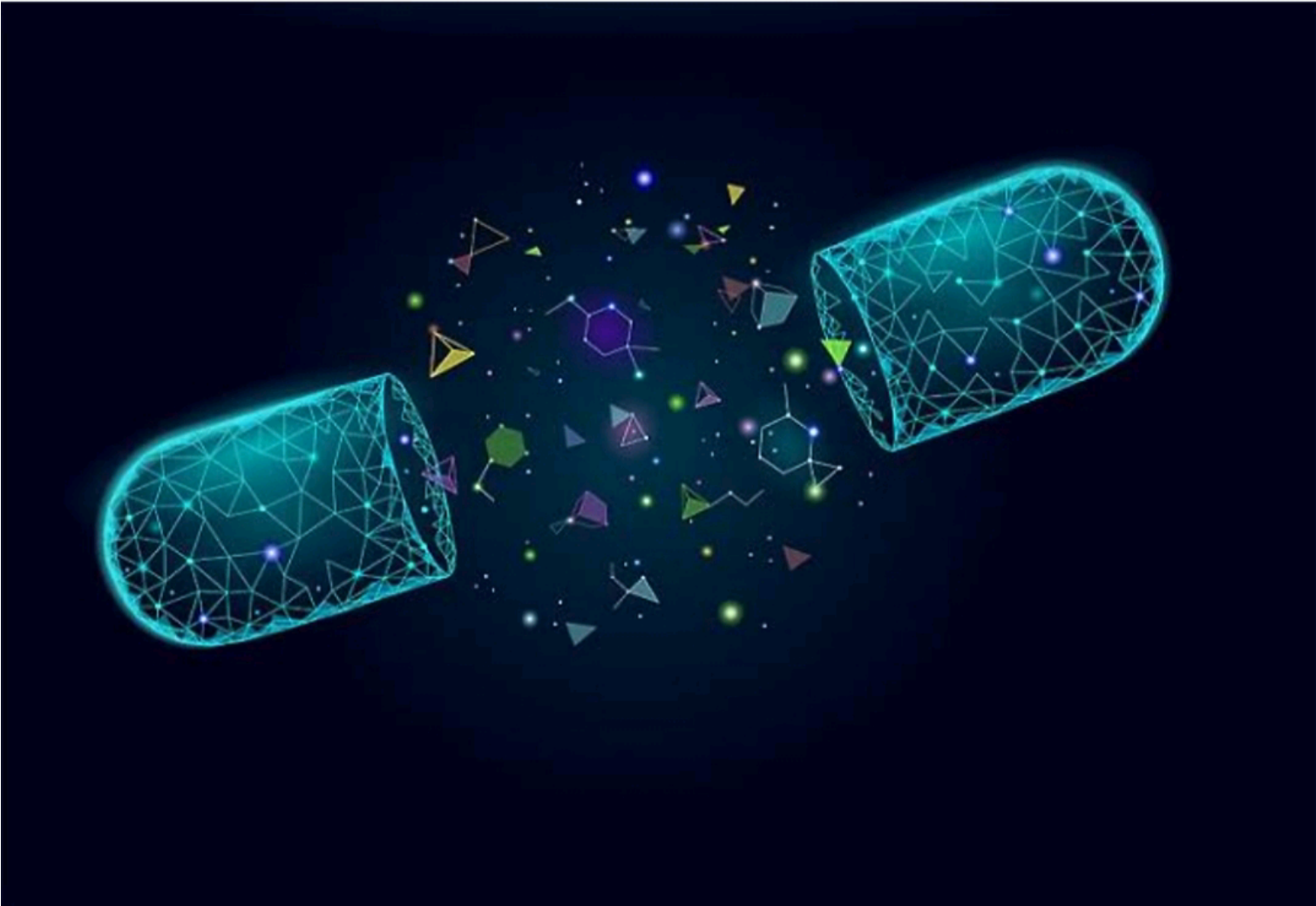
- Higher dose loading
- Reduce irritation of drug at site of administration
- Greater protection from degradation during storage and after administration.
- Site specific action
- Increase bio-availability of drug.
- Control and sustain release of the drug at the site of localization.
- The system can be used for various routes of administration including oral, nasal, parental etc.
- Improve patient Compliance.



DISADVANTAGES of nanoparticles

[Capsules]

- Extensive use of poly vinyl alcohol as detergent issues.
- Limited targeting abilities.
- Discontinuation of therapy is not possible.
- Alveolar inflammation
- Cytotoxicity
- pulmonary inflammation & pulmonary Carcinogenicity.
- The disturbance of autonomic imbalance by nanoparticles having direct effect on heart and vascular function.





Nanomedicine
molecular nanotechnology

PREPARATION

Preparation of
Nano Capsules.

Nano precipitation method

Emulsion diffusion method

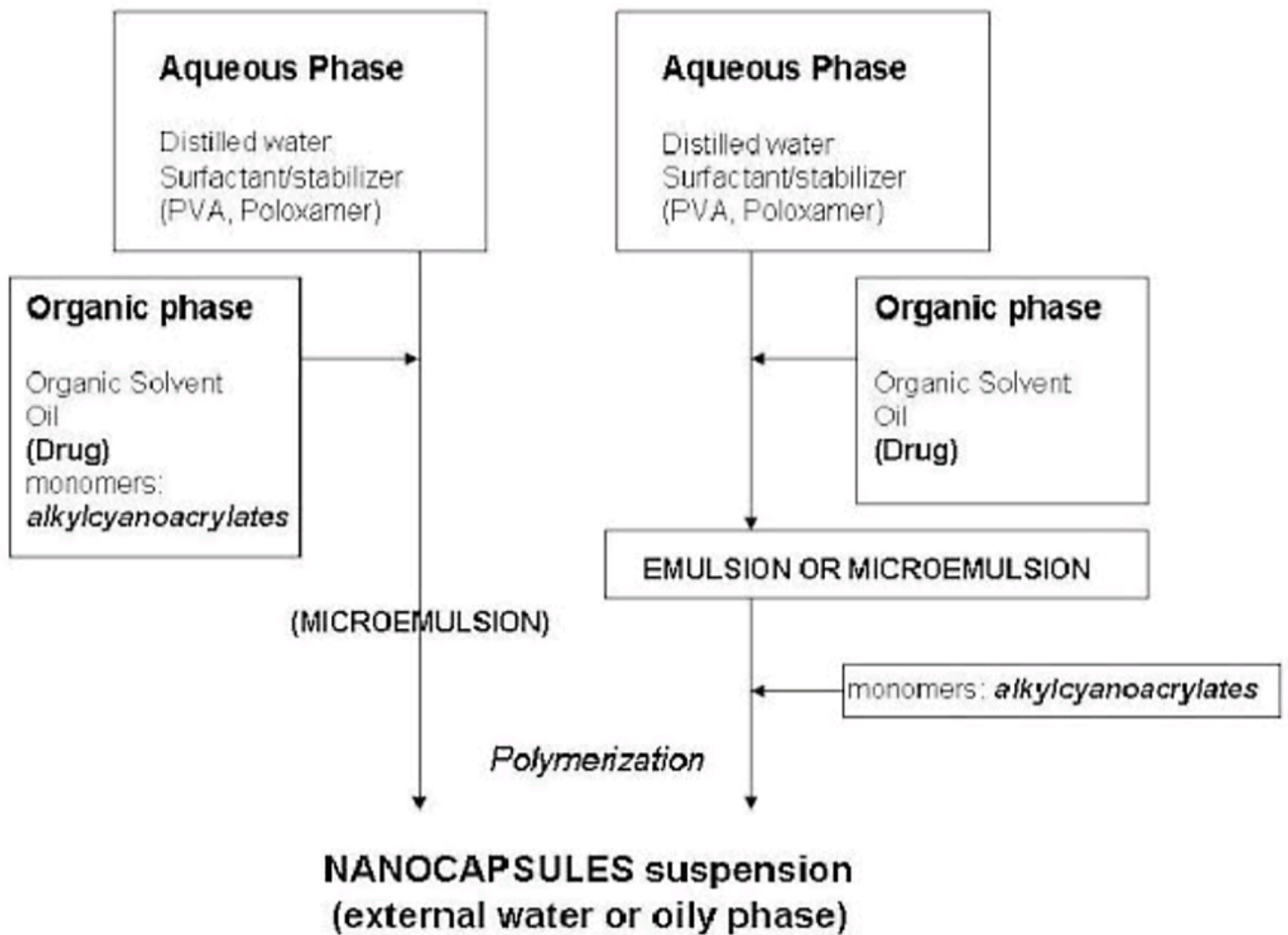
Double emulsification method

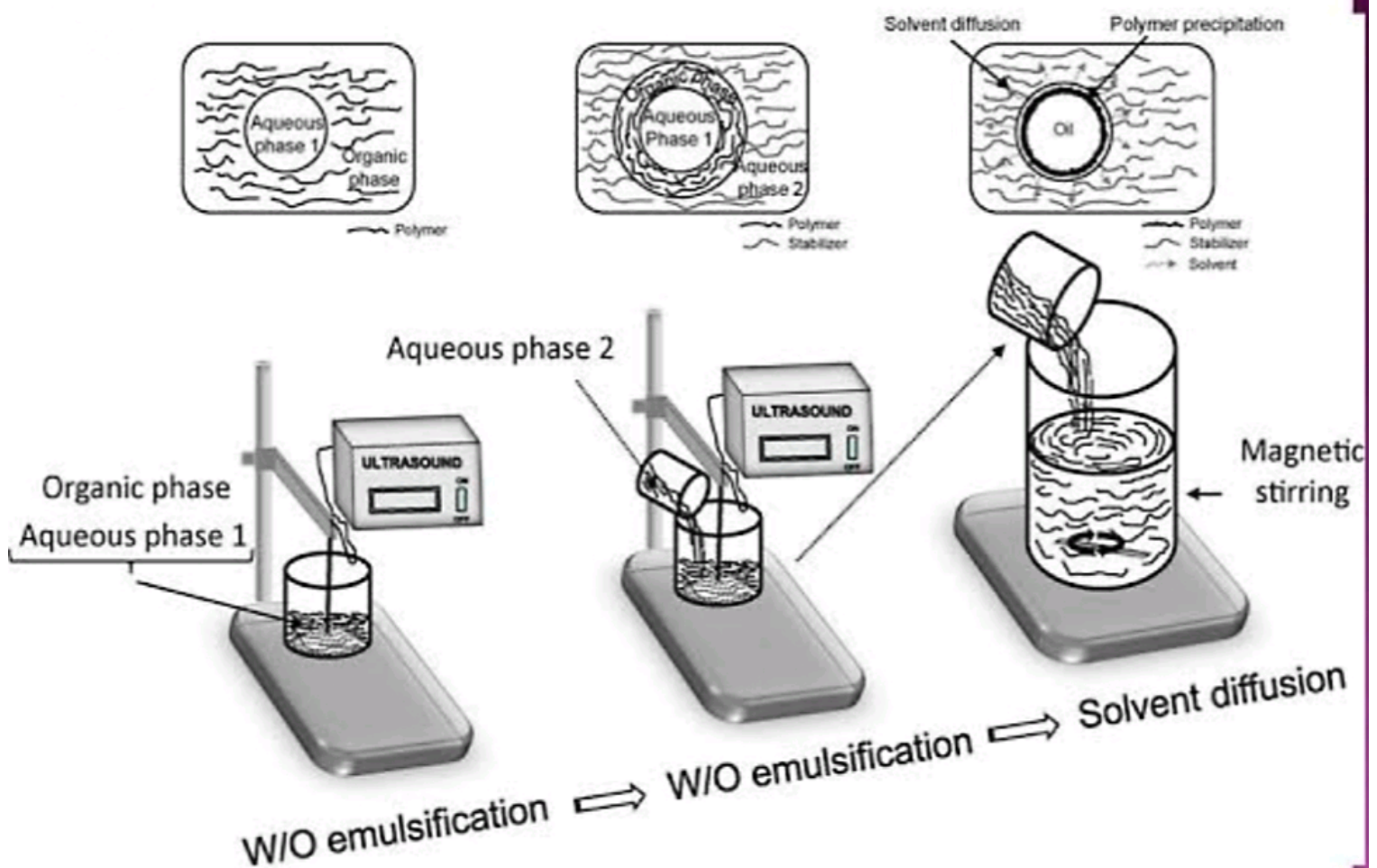
Emulsion coacervation

Polymer - Coating method

Layer-by-layer method.

INTERFACIAL POLYMERIZATION





• Fig3. Set-up used for preparation of nanocapsules by the double emulsification method.

APPLICATIONS

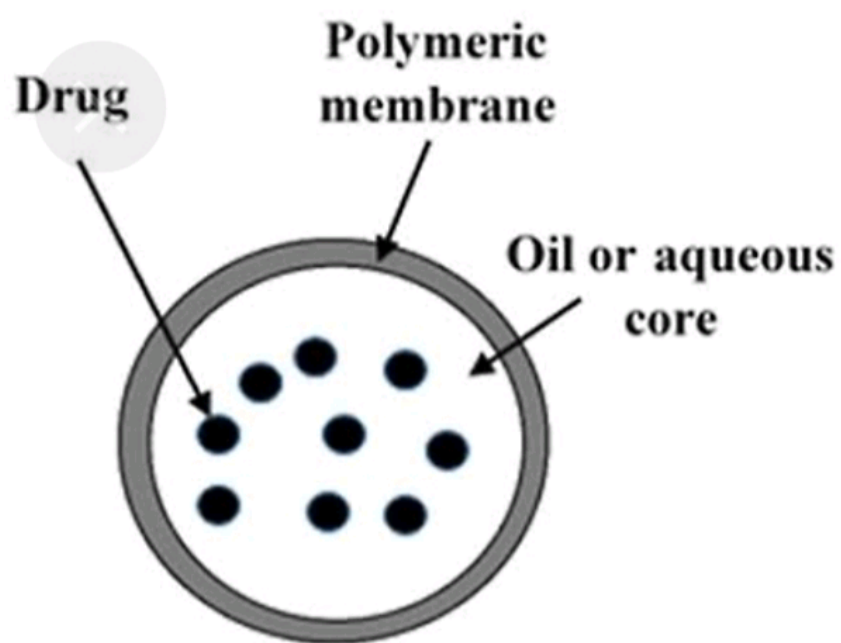
Oral route :

Indomethacin an anti-inflammatory drug has been successfully encapsulated in the poly alkylacrylate 'nano Capsules' with the aim of reducing its side effect on the gastric and intestinal mucosa.

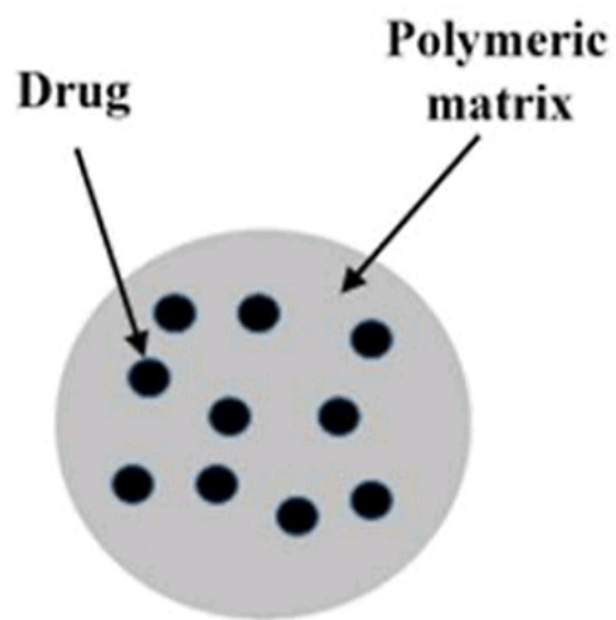
Diclofenac and indomethacin two major non-steroidal anti-inflammatory agents, have been encapsulated in poly (lactic acid) nanocapsules obtained by nano precipitation with the aim of reducing their side effects on the gastric mucosa.

Insulin-loaded nano capsules yielded promising pharmacological results.

Anti-infectious agents such as atovaquone and Rifabutin two compounds active against the opportunistic parasite *Toxoplasma*. were successfully entrapped in poly (lactic acid) nano capsules formed by nano precipitation.



Nanocapsule



Nanosphere

Conclusion :

The main goal of this review was to describe the different preparation techniques available for production of polymeric nanoparticles. The drug loaded Nanosphere / nanocapsules now can be produced by simple, safe and reproducible techniques.

Nano particle preparation methods have been marked by aspects :

- ✓ Need for less toxic reagents
- ✓ Simplification of the procedure to allow economic up.
- ✓ Optimization to improve yield and entrapment efficiency.

THANK YOU!