



**2022/2023**

**Fifth Stage**

**First Semester/ Industrial Pharmacy II**



# Microencapsulation

## Lectures 15

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# *Salt addition*

Soluble inorganic salts (or strong hydrophilic electrolyte) can be added into a large amount to aqueous solution of certain water soluble polymers to cause phase separation by salting out effect (abstraction of hydration water from the polymer) like addition of sodium sulfate 20%.

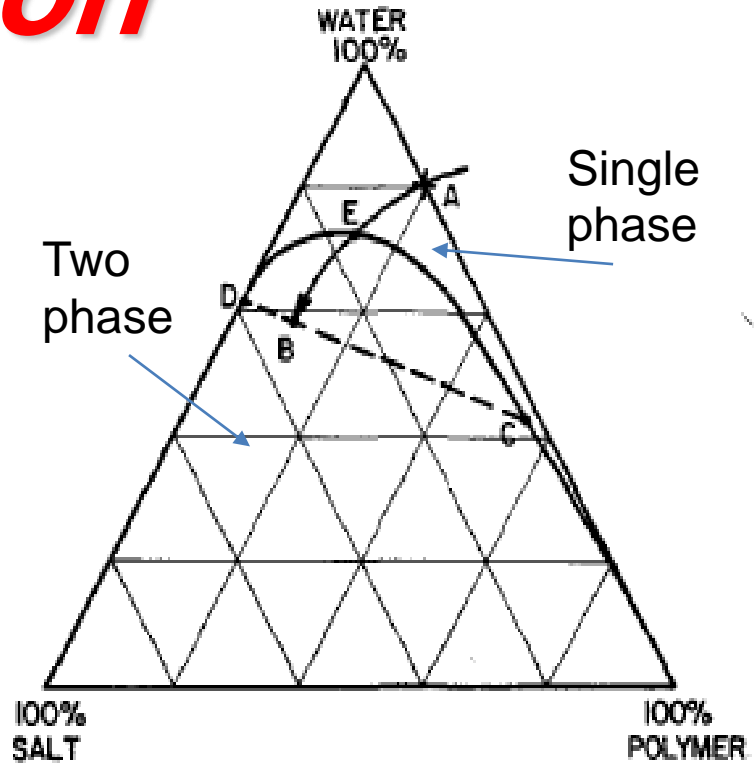
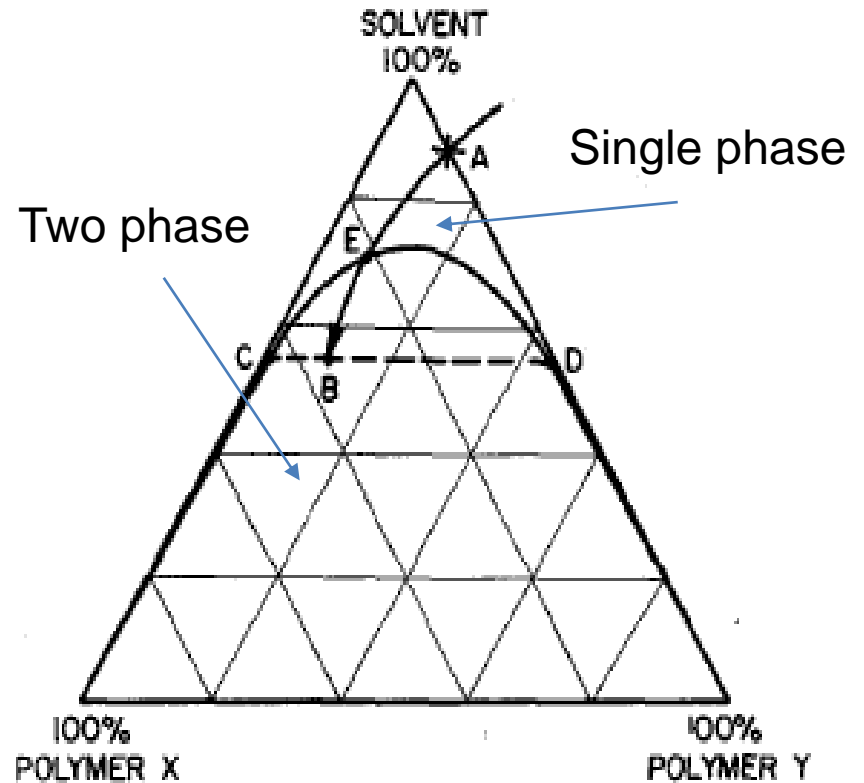


FIG. 13-42. General phase diagram for phase-separation/coacervation induced by salt addition. (From Bakan.<sup>28</sup>)

## *Incompatible polymer addition*

Liquid phase separation of a polymeric coating material can be occurred by using the **incompatibility of dissimilar polymers** existing in a common solvent. It does not involve any chemical reaction, one phase is rich in polymer designed to act as wall material and the other is rich in the second incompatible polymer



**FIG. 13-40.** General phase diagram of phase-separation/coacervation induced by the addition of an incompatible polymer. (From Bakan.<sup>28</sup>)

# Polymer-polymer interaction

It occurred when two oppositely charged lyophilic colloids are mixed (like acacia-gelatin system) to form a complex having such reduced solubility to cause phase separation  
 coacervation.  
 Here, gelatin at a pH less than its isoelectric point (positively charged), acacia is negatively charged (acidic gum), under proper temperature (like 40°C), pH (~4) and concentration.

Chemical reaction is occurred between the two polymers.

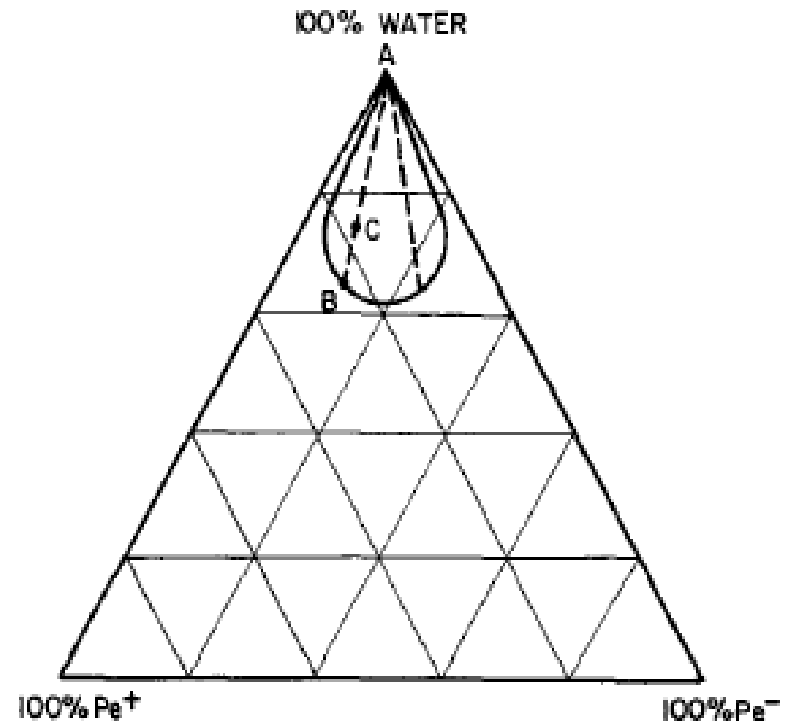
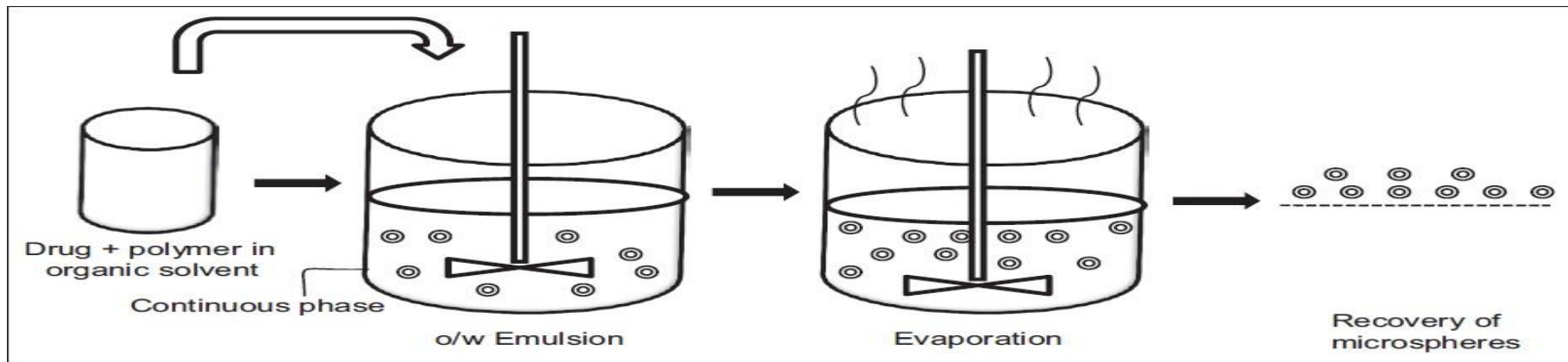


FIG. 13-43. Phase diagram for phase-separation/coacervation by polymer interaction. (From Bakan.<sup>28</sup>)

# Solvent evaporation

- Is the most popular, in which the core and wall materials are dissolved in water-immiscible volatile organic solvent and the resulting solution is emulsified in an aqueous solution.
- The solvent is allowed to evaporate, thereby producing solid microparticles.



- Also, the drug may be dispersed into second solvent (different beaker) and then added.
- We have different solvent systems (o/w), (o/o), (w/o/w)...
- There is limitation for use of aqueous dispersion phase in case of water soluble drugs?? Why and how treated??

