

Before Going to Slides Please Note

- This document is for a quick revision only
- Go through your book in case of any confusion/mistake
- Definitions are generally not discussed in this revision note
- Go through it only if you find it useful.
- Obviously syllabus is



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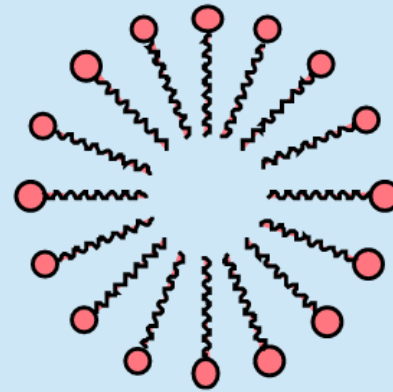
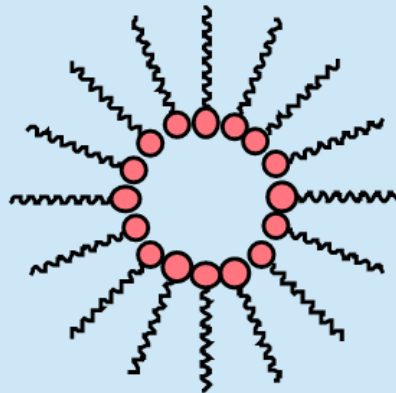
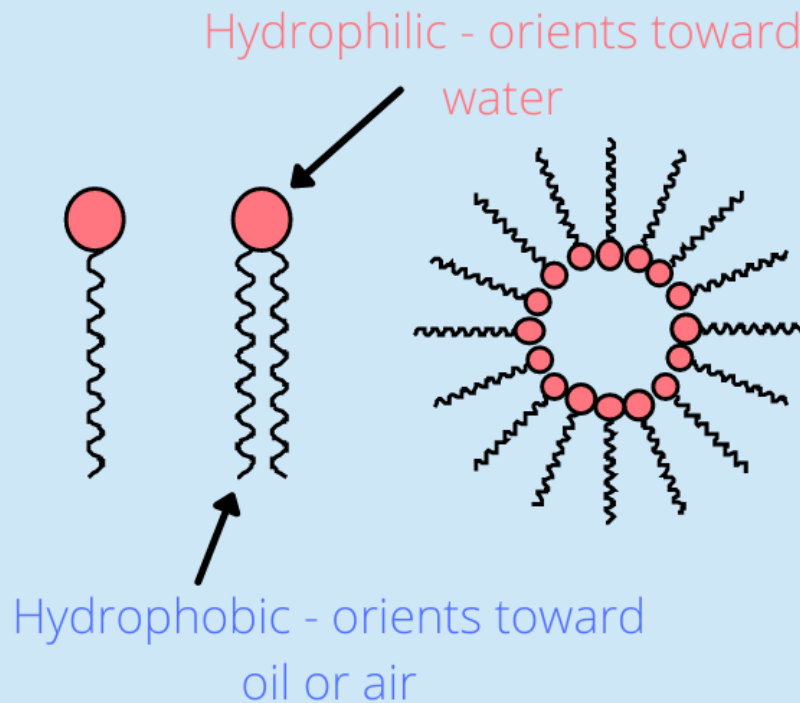
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What Is a Surfactant?

A surfactant is a chemical that lowers surface tension.

Each surfactant molecule has a hydrophilic or water-loving component and a hydrophobic or water-fearing component.



micelle

Examples

- detergent
- emulsifier
- wetting agent
- foaming agent

Surfactant type	Example	Use
Anionic	Alkyl sulfates, soaps, Calsoft®, Texapon®	50 % of overall industrial production, laundry detergent, dishwashing liquids, shampoos
Cationic	Quaternary ammonium salts	Used together with nonionic surfactants but not with anionic, softeners in textiles, anti-static additives
Nonionic	Ethoxylated aliphatic alcohol, polyoxyethylene surfactants, Triton™ X-100, Span®, Tergitol™	45 % of overall industrial production, a wetting agent in coatings, food ingredient
Zwitterionic	Betaines, amphotacetates	Expensive, special use e.g. cosmetics

HYDROPHOBIC MOLECULES VERSUS HYDROPHILIC MOLECULES

Hydrophobic molecules
are molecules that do not
dissolve in water

Called hydrophobes

Repel water molecules

Nonpolar

When added to water,
Gibbs free energy gets a
positive value

When added to water,
the entropy is decreased

Dissolving them in water
is an endothermic reaction

Hydrophilic molecules
are molecules that can
dissolve in water

Called hydrophiles

Attract water molecules

Polar

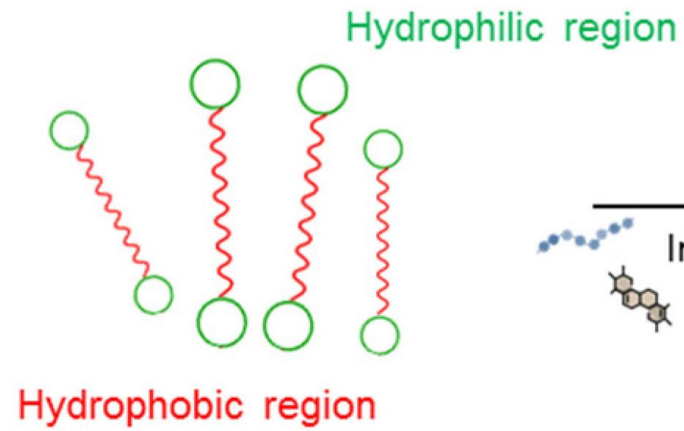
When added to water,
Gibbs free energy gets
a negative value

When added to water,
the entropy is increased

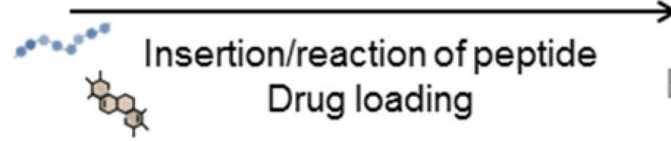
Dissolving them in water
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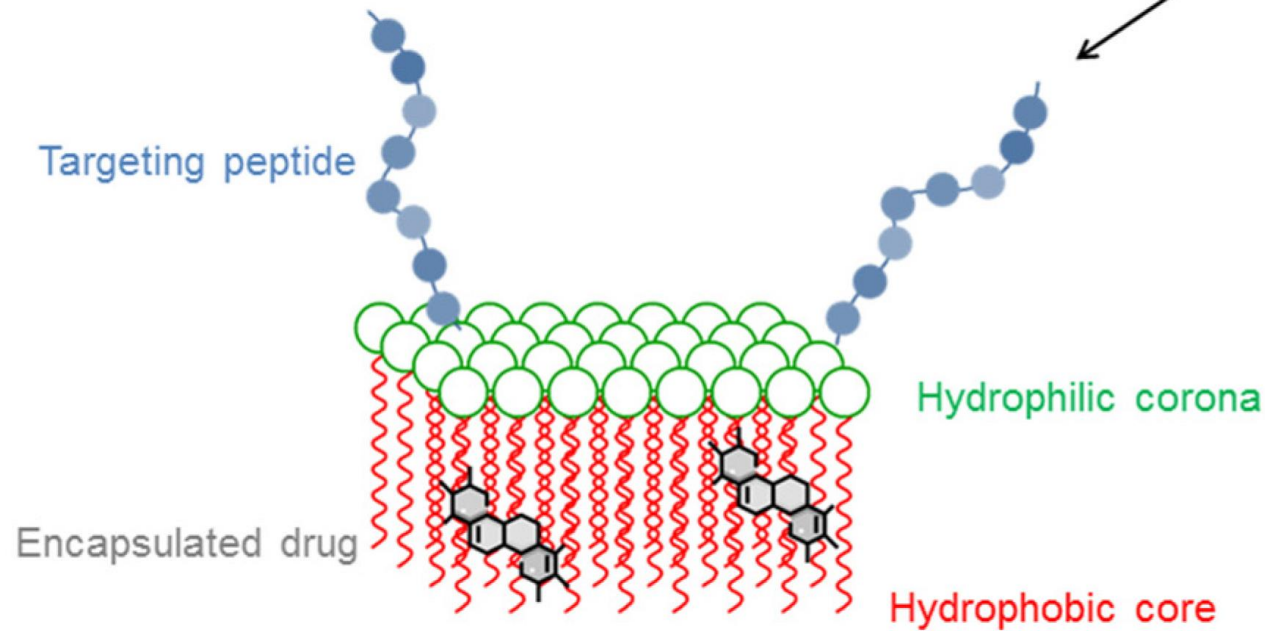
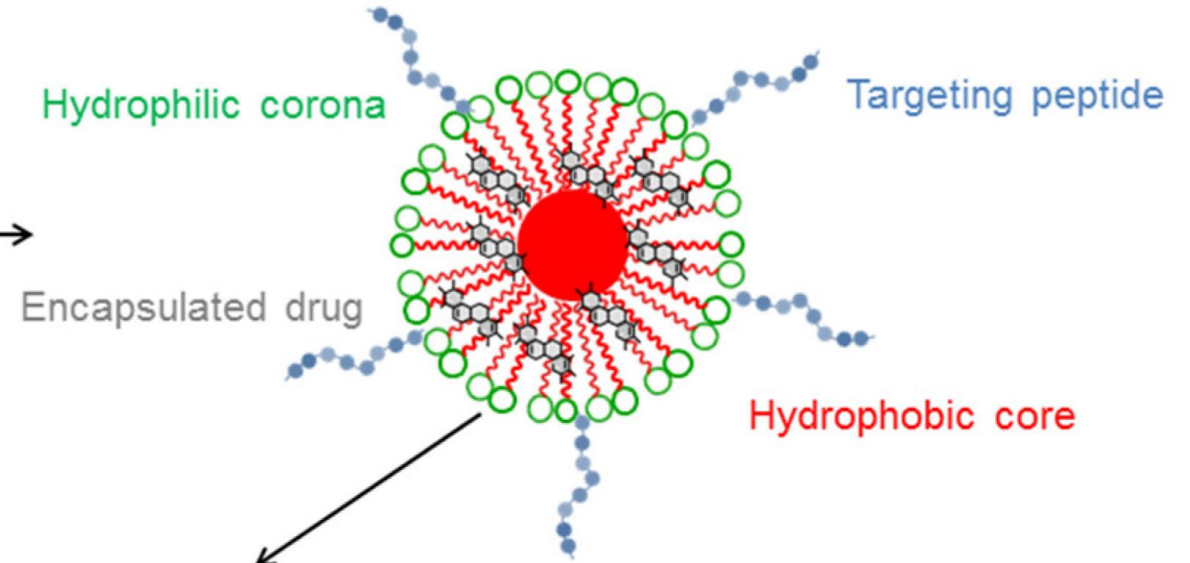
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Micelles formulation



Micelles

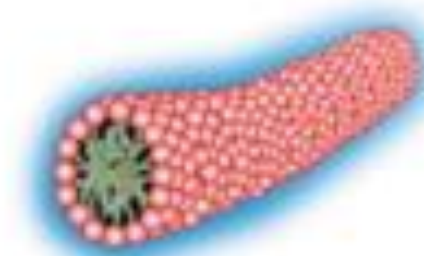
- A micelle is an aggregate (or supramolecular assembly) of surfactant amphipathic lipid molecules dispersed in a liquid, forming a colloidal suspension
- Micelles are oriented colloidal Aggregates
- General Important Shapes of Micelles are:
 - Spherical-
 - Elongated Cylindrical- (Rod like with hemispherical Ends)
 - Flat Lamellar Micelles- (Disc like extended oblate spheroids)
 - Vesicles- one or more concentric spheres



Micellar, L_1



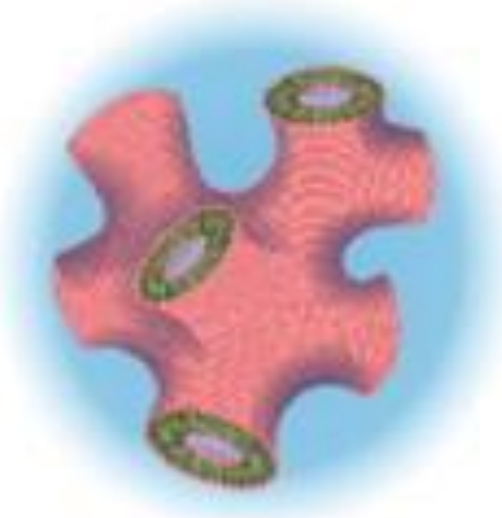
Reverse
micellar, L_2



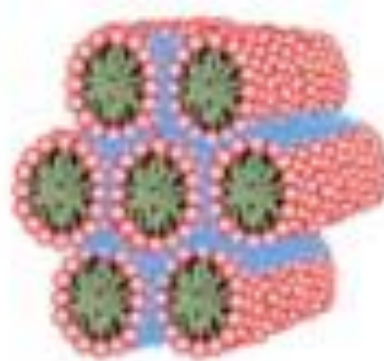
Rod-like
micellar, L_1



Lamellar, L_α



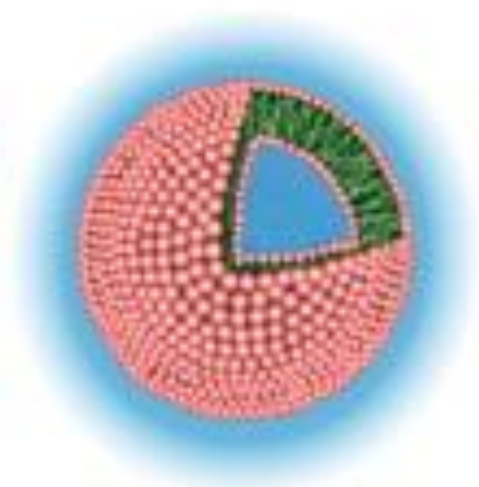
Disordered
sponge, L_3



Hexagonal, H_1



Cubic, V_1



Vesicular, L_α

Micellization

- Molecular Aggregates that are formed above CMC are known as Micelles
- Micellar Colloids are in dynamic Equilibrium with Monomers
- Aggregation Process depends on amphiphilic species and condition of system of dissolution
- This may lead to changes in several Physicochemical properties

Critical Micellar Concentration (CMC)

- The **critical micelle concentration (CMC)** is defined as the concentration of surfactants above which micelles form and all additional surfactants added to the system will form micelles
- After reaching the CMC, the surface tension remains relatively constant or changes with a lower slope
- Micelles only form above critical micelle temperature

Factors Affecting CMC in Aqueous medium

- Structure of Surfactant
- Concentration of Electrolyte
- Addition of External Materials
- Presence of Second Liquid Phase
- Temperature

