

ABSTRACT

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TITLE: Investigations on Aggregation of Soft Systems

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The study of mixed surfactants, encompassing cationic, anionic, gemini, zwitterionic, and non-ionic types, has progressed significantly due to their formation of 'mixed micelles' in aqueous solutions. This formation is crucial for understanding biological assemblies, ion transfer, drug delivery, and biomimetic systems. Mixed surfactants play a pivotal role in pharmaceuticals, detergents, food, cosmetics, drug solubilization, and enhanced oil recovery.

Alcohols, acting as cosurfactants or cosolvents, influence the critical micelle concentration (CMC) in amphiphile self-assembly. 2,2,2-Trifluoroethanol (TFE), notable for its use in protein denaturation and unique properties from the trifluoromethyl (CF_3) group, is highly water-soluble despite its hydrophobic $-\text{CF}_3$ terminal. The study of surfactant aggregation in TFE is underexplored. Alcohols' solubilization and hydrogen bonding capabilities make them preferred solvents.

Chlorpromazine (CPZ), known as Thorazine or Largactil, treats conditions such as schizophrenia, anxiety, nausea, and bipolar disorder but can cause side effects. Combining CPZ with surfactants can help mitigate these side effects.

Cyclodextrin (CD)-based molecular recognition is significant in supramolecular chemistry due to its strong binding with various substrates. CDs form structures such as catenanes, rotaxanes, supramolecular polymers, and functionalized nanoparticles. Triton X, a widely used detergent, lyses cells for organelle and protein extraction and is used in vaccines. It solubilizes proteins under mild conditions, aiding biological and biochemical research.

Bile acids are essential in supramolecular synthesis and the development of photorheological fluids. Research on mixed micelle formation in pharmaceuticals has focused on phospholipids and bile salts. Understanding bile salts' impact on non-ionic micelles can reveal molecular interactions critical for fat digestion and other biological processes.

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