

Summary

Chapter 1 gives the brief introduction about [60] fullerene, its discovery, production, structure. It also describes the physical properties of [60] fullerene like solubility in various organic solvents and in detail in aqueous media. In this Chapter, previous studies related to the research area of solubility of [60] fullerene in water is discussed. Mainly this chapter emphasizes on the method using various surfactants to solubilise [60] fullerene in water, without functionalizing [60]fullerene. Chapter 1 also briefs about the chemistry, reactions and applications of [6] fullerene.

Chapter 2 gives the experimental methods used to solubilise [60]fullerene in water using nonionic surfactants Tween 80, Triton X100, anionic SDS and cationic CTAB surfactants with cosurfactants. It describes the experimental method for the emulsion and microemulsion system using prescribed surfactants with and without [60] fullerene. The Chapter briefs about method used to calculate critical reverse micelle of [60]fullerene-surfactant solution in toluene using UV VIS spectroscopy. It also provides the method to study fluorescence for microemulsion systems.

Chapter 3 provides various results obtained from the miscibility data of [60] fullerene in water. Results of the experimental findings and interpretation of the findings is described in this chapter. It gives an idea about the amount of water consumed with and without [60]fullerene using different surfactants along with co-surfactants. Phase behavior study of [60]fullerene-Toluene-Surfactants-cosurfactants in water has been described. Chapter 3 also provides the information about the monophasic (1Φ) i.e. microemulsion region and biphasic (2Φ) i.e. emulsion region on the basis of pseudo ternary phase diagrams for all four surfactants in the presence of [60]fullerene and in absence of [60] fullerene. In this chapter using UV-VIS spectroscopy, value of critical reverse micelle for Tween 80, Triton X- 100, SDS and CTAB has been calculated. From which the thermodynamic properties like standard free energy, enthalpy and entropy have been calculated. The formation of reverse micelle at different temperatures will lead to the better understanding of the interaction between the hydrophobic surface of the fullerene and the polar water molecules.

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The fluorescence of microemulsion systems of [60]fullerene-toluene-surfactants-cosurfactants in water were studied, which offers the idea about the solute solvent interactions in microemulsion systems and interaction with [60]fullerene.

Chapter 4 gives the conclusions obtained from the various studies carried during the course of this work.