

## Spectroscopic Studies on Solubilization of Polycyclic Aromatic Hydrocarbons in Structurally Different Gemini Surfactants

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**Abstract :** Polycyclic aromatic hydrocarbons (PAHs) are potent atmospheric pollutants that consist of two or more benzene rings. PAHs have low solubility in water. Their slow dissolution can contaminate large amounts of ground water for long period. They are hydrophobic, non-polar and neutral in nature and are known to have potential mutagenic or carcinogenic activity. In current scenario their removal from the environment, water and soil is still a great challenge and scientists worldwide are engaged to invent and design novel separation technology and decontaminating systems. Various physical, chemical, biological and their combined technologies have been applied to remediate organic-contaminated soils and groundwater. Surfactants play a vital role in the solubilization of these hydrophobic organic compounds. In the present investigation Solubilization capabilities of structurally different gemini surfactants i.e. butanediyl-1,4-bis(dimethyldodecylammonium bromide) (C12-4-C12,2Br-), 2-butanol-1,4-bis (dimethyldodecylammonium bromide) (C12-4(OH)-C12,2Br-), 2,3-butanediol-1,4-bis (dimethyldodecylammonium bromide) (C12-4(OH)2-C12,2Br-) for three polycyclic aromatic hydrocarbons (PAHs); phenanthrene (Phe), fluorene (Fluo) and acenaphthene (Ace) have been studied spectrophotometrically at 300 K. The result showed that the solubility of PAHs increases linearly with increasing surfactant concentration, as an implication of association between the PAHs and micelles. Molar solubilization ratio (MSR), micelle-water partition coefficient (Km) and Gibb's free energy of solubilization ( $\Delta G^\circ$ s) for PAHs have been determined in aqueous medium. (C12-4(OH)2-C12,2Br-) shows the higher solubilization for all PAHs. Findings of the present investigation may be useful to understand the role of appropriate surfactant system for the solubilization of toxic hydrophobic organic compounds.

**Keywords :** gemini surfactant, molar solubilization ratio, polycyclic aromatic hydrocarbon, solubilization

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