

Solubilization of pyrene by nano carriers of anionic polymer - cationic / nonionic surfactant: Effect of polymer concentration

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Abstract: The presence of PAHs in soil poses potential threat to human health. The removal of these contaminants presents a challenge to scientists and engineers because of their low aqueous solubility. Numerous attempts, involving physical, chemical, biological, and their combined technologies, have been made to remedy PAH contaminated soils and ground water. Surfactant enhanced remediation (SER) has been proposed as a promising technology for removal of residual organics (complex mixtures containing a number of PAHs) existing in the sorbed state at contaminated sub surfaces. Polymers can be used to modulate the stability and functionality of surfactant micelles. Surfactant-polymer interactions have been of substantial interest, they have been shown to be of importance in creating mixed micelles or core shell nanoparticles that may be used in a wide variety of industrial applications. The change in micellar structure may in turn alter the ability of micelles to solubilize hydrophobic compounds.

In this study, I will discuss how solubilization behavior of surfactants like nonionic polyoxyethylene [10] cetyl ether (Brij56) and cationic cetyltrimethyl ammonium bromide (CTAB) will be altered on addition of anionic polymer NaCMC (Sodium carboxy methyl cellulose) towards pyrene (PAH). Solubilization efficiency of these mixed systems and their comparison with individual systems has been quantified in terms of the molar solubilization ratio, micelle - water partition coefficient and free energy of solubilization. While the addition of anionic polymer NaCMC accelerates the solubilization capacity of cationic CTAB micelles that of nonionic Brij56 micelles was retarded. Moreover the Solubilization capacity of above said mixed systems gets enhanced as the polymer concentration changes from below overlap (0.5 %) concentration to overlap concentration (1 %).

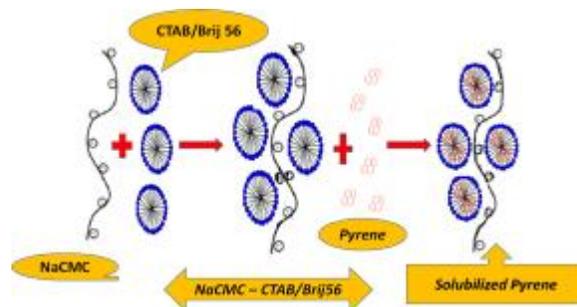


Figure 1 : Schematic representation of solubilization of pyrene in surfactant – polymer systems.

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