

Bile Salt Induced Microstructural Changes of Gemini Surfactant Micelles

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Abstract : Microstructural evolution of a cationic gemini surfactant 12-4-12 micelles in the presence of bile salts has been investigated using different techniques. A negative value of interaction parameter evaluated from surface tension measurements is a signature of strong synergistic interaction between oppositely charged surfactants. Both the bile salts compete with each other in inducing the micellar transition of 12-4-12 micelles depending on their hydrophobicity. Viscosity measurements disclose that loading of bile salts induces morphological changes in 12-4-12 micelles; sodium deoxycholate is more efficient in altering the aggregation behaviour of 12-4-12 micelles compared to sodium cholate and presents pronounced increase in viscosity and micellar growth which is suppressed at elevated temperatures. A remarkable growth of 12-4-12 micelles in the presence of sodium deoxycholate at low pH has been ascribed to the solubilization of bile acids formed in acidic medium. Small angle neutron scattering experiments provided size and shape of 12-4-12/bile salt mixed micelles are explicated on the basis of hydrophobicity of bile salts. The location of bile salts in micelle was determined from nuclear overhauser effect spectroscopy. The present study characterizes 12-4-12 gemini-bile salt mixed systems which significantly enriches our knowledge, and such a structural transition provides an opportunity to use these bioamphiphiles as delivery vehicles and in some pharmaceutical formulations.

Keywords : gemini surfactants, bile salts, SANS (small angle neutron scattering), NOESY (nuclear overhauser effect spectroscopy)

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