

The dynamics of micellization of gemini imidazolium surfactants studied by NMR, FT-IR and SR-SAXS

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Gemini surfactants, also known as dimeric or dicationic surfactants are recently studied as components of drug delivery systems, especially for gene therapy [1,2]. This group of surfactants has cmc (critical micellization concentration) much lower than that of a monomeric surfactants with equivalent aliphatic chain length [3].

The aim of this study was the characterization of structural parameters and cmc values characterizing the solutions of selected gemini surfactants (3,3'-[α,ω -dioxalkane] bis(1-alkylimidazolium) chlorides).

The critical micellization concentration for imidazolium gemini surfactants with spacer widths ranging from 2 to 8 methylene groups were obtained.

At the first stage the concentrated solutions of gemini surfactants (over cmc) were characterized by the use of small angle scattering of synchrotron radiation technique (SR-SAXS).

High resolution DOSY NMR revealed some unusual aggregation behavior, related to high polydispersity of surfactant aggregates for the concentrations higher than CMC. Obtained cmc's values ranged from 0.01 mM up to 1 mM. Furthermore pH dependence was observed as a result of electrostatic interaction between imidazolium ions.

The complex dynamics of spacer was confirmed by FT-IR studies. Additionally selected systems were characterized by FFC spectroscopy.

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