

Role of intermolecular interactions in behavior of colloidal parameters of an anionic surfactant in aqueous-aminoacids solutions

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Intermolecular weak interactions have great effect on colloidal parameters' behavior in aqueous-micellar solutions of surfactants both in the absence and presence of additives [1,2]. In general, it can be said that detected behaviors and water structural changes, as suggests Frank and Evans model [3], in surfactants solutions is a result of together acting of different types of intermolecular interactions. In this paper the role of intermolecular interactions on physicochemical and colloidal parameters of anionic surfactant alpha olefin sodium sulfonate C₁₄₋₁₆AOS in the presence of aminoacids (AA) L-glycine, L-alanine and L-leucine is discussed. In the system C₁₄₋₁₆AOS-AA-water the following interactions are possible: 1) hydrophobic-hydrophobic interactions between alkyl chains of C₁₄₋₁₆AOS and AA; 2) hydrophilic-hydrophilic interactions; 3) ion-hydrophilic interactions between charged groups of AA (NH_3^+ , COO^-) and hydrophilic groups (headgroups) of C₁₄₋₁₆AOS; 4) ion-ion interactions between SO_3^- groups of C₁₄₋₁₆AOS and NH_3^+ groups of AA, and Na^+ ions of C₁₄₋₁₆AOS and COO^- groups of AA (electrostatic interactions). It is established that an increase of both AA concentration and temperature micellization is inhibited and aggregation number of C₁₄₋₁₆AOS decreases with increase of AA concentration. Obtained results indicate that at low temperatures in aqueous-micellar solutions of C₁₄₋₁₆AOS in the presence of glycine and alanine hydrophobic-hydrophobic interactions are dominant, while in high temperatures ion-ion and hydrophilic-hydrophilic interactions become dominant. In the presence of leucine at whole studied temperature range hydrophobic-hydrophobic interactions are dominant. It can be a result of high hydrophobicity of leucine compared to hydrophobicity of glycine and alanine. At the same time behavior of volumetric properties of C₁₄₋₁₆AOS-AA-water system indicates that interactions between zwitterionic groups and molecules/micelles of C₁₄₋₁₆AOS are stronger than hydrophobic interactions between alkyl groups of AA and molecules/micelles of C₁₄₋₁₆AOS.

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2. Harutyunyan L.R. Journal of Surfactants and Detergents 2015, v. 18, n. 1, p. 73-81.
3. Frank H.S., Evans M.W. The Journal of Chemical Physics 1945, v. 13, is. 11, p. 507-532.