Micellization of long-chain carboxylates in aqueous solutions

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Cationic surfactants, especially quaternary ammonium salts, have been widely studied, whereas less attention has been devoted to anionic surfactants [1]. Among them, alkyl sulfates belong to the most studied surfactants [2], however alkyl carboxylates are somewhat overlooked.

At classical ionic surfactants the influence of counter-ion on micellization has often been the subject of systematic studies [1,2]. However, in mixtures of cationic and anionic surfactants both, anion and cation are able to form micelles [3], but by simply mixing of two ionic surfactants the counter-ions are present in the system and can influence many properties. Studies on pure "mixed" ionic surfactants where both, anion and cation tend to form micelles without the presence of any other species are rare.

In this contribution, first the influence of alkali metal cations on the micellization process of long-chain carboxylate surfactants as anionic surfactants in aqueous solution will be shown [4]. Next, the parameters for micellization process of long-chain carboxylates in the presence of alkyltrimethylammonium cations with different length of alkyl chains (6-10 carbon atoms) will be presented.

The micellization process will be investigated by electrical conductivity measurements and isothermal titration calorimetry. Experimental data will be analysed by help of a revised pseudo phase separation model in order to obtain the thermodynamic parameters of aggregation process (free energy, enthalpy, entropy and heat capacity changes).

Finally, the relation between the heat capacity change and the hydrophobic effect, affected by the additional hydrophobic surface included into the dehydration process upon micellization, will be discussed and compared with already investigated systems.

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