Influence of MEGA10 addition on the micellar growth of alkanediyl-α-ω-bis(dodecyldimethylammonium) bromide micelles

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Study of the means to control the shape of micelles has always been an important topic of research in surfactant science since micelle shape influences properties of surfactant solutions [1]. In this work, the micellar growth in pure aqueous alkanediyl-α-ω-bis(dodecyldimethylammonium) bromide, 12-s-12,2Br (with s=2,5,6,8,10,12), as well as in their mixtures with N decanoyl N-methylglucamide, MEGA10, was investigated at 303 K. From the comparison of the results obtained in the investigation of the sphere-to-rod morphological transition in the pure dimeric micellar solutions at 303 K with those obtained at 298 K, the key role played by the spacer in the micellar growth was shown. The spacer length not only controls the surfactant concentration at which the morphological transition happens, but also the sign of the enthalpy change accompanying the sphere-to-rod equilibrium. Spacers with an even number of methylenes show smaller C* values than those with an odd number of –CH2- units. An endothermic enthalpy change is found for even spacers whereas an exothermic enthalpy change is found for odd spacers. To the authors knowledge this is the first time this experimental trend has been shown.

Addition of MEGA10 diminishes the tendency of the aggregates to grow, as is shown by fluorescence and cryoTEM measurements. An increment in the solution mole fraction of MEGA10 makes the formation of elongated micelles difficult. Microviscosity measurements provide additional information about the influence of the MEGA10 content on the sphere-to-rod transition.


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