Shape, Polydispersity and Aggregation Number of Alkyl Sulphate Micelles

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Based on the thermodynamic consideration that the micellar cores are compact and consist entirely of portions of the hydrocarbon chains, the length of the latter should limit at least one micellar dimension. Due to the fluctuations in the local electrostatic field, the hydrocarbon chains in ionic micelles with realistic aggregation numbers can fit the above spatial constraints only if the micellar shape is a prolate or oblate ellipsoid.

The recent methods of interpreting experimental data are ambiguous in this respect in that the results they provide may be compatible with each of the above given types of micellar shape. One of the reasons for this is that the scattering pattern from monodisperse spheroids can be fitted e.g. by a set of polydisperse spheres. The present work is devoted to demonstrate that the scattering patterns from alkyl sulphate micelles can be well fitted by assuming either monodisperse prolate- or polydisperse oblate ellipsoidal micelles. Because the two types of micelle have significantly different mean aggregation numbers, the decision on the shape and polydispersity may be based on independent information of the mean aggregation number stemming e.g. from thermodynamic theories.

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