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STRUCTURE OF MICELLES OF SODIUM DODECYL SULPHATE IN WATER: AN X-RAY AND DYNAMIC LIGHT SCATTERING STUDY

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Abstract. Aqueous micellar solutions of sodium dodecyl sulphate (SDS) were investigated using X-ray scattering technique in the concentration range 0.008–0.1 M and analyzed by a model-independent approach. The obtained diameter of the spherical micelle (6.0 nm) with concentration 0.01 M is greater than that analyzed by direct modeling and by small-angle neutron scattering (4.4 nm). In the study of SDS solution of 0.01 M concentration by dynamic light scattering method, the following three hydrodynamic spheres were identified: SDS dimers and two micelles with water. The diffusion rate of these spheres decreases with the increase of their size. When adding 0.01 M of NaCl the dimers disappear, and the hydrodynamic spheres with diameter of 3.14 nm appear. The results are discussed in the framework of the concept of polyamorphous transition between ensembles of water clusters of low and high density levels. Polyamorphous transition accompanies the formation of dual structures of contact and separated by water micelles with different rates of diffusion.

Keywords: sodium dodecyl sulphate, micelle structure, small-angle X-ray scattering, wide-angle X-ray scattering, dynamic light scattering.

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