

Investigation of Structure of Water Nano Droplets Confined in Brij-30 Reverse Micelles with an Ultraviolet-visible Spectroscopic Method

Natia Mzareulishvili

Department of Chemistry, Faculty of Exact and Natural Sciences, I.Javakhishvili Tbilisi State University, 3, I.Chavchavadzeave., Tbilisi, 0179, Georgia

e-mail: natia.mzareulishvili@gmail.com

Reverse micelles became very popular in different areas of life sciences [1]. Reverse micelles are isolated, surfactant-coated water droplets, which are frequently used as a model for confined water in biological systems [2]. Nonionic surfactants provide milder environment for encapsulation of enzymes and proteins inside the water nanocages of reverse micelles in comparison with ionic reverse micelles. Therefore nonionic surfactants are used for doping the interface of anionic reverse micelles. Reverse micelles have been investigated with different physicochemical methods depending complex structure of water droplets. Investigation of reverse micelles through the UV-visible absorption spectra of optical probes provides important information about nature of water in water droplets of reverse micelles [3].

The microenvironment of reverse micelles of polyoxyethylene (4) lauryl ether (Brij 30) was investigated with an UV-visible spectroscopic method on the basis of methyl orange (MO) as molecular probe.

The influence of both additives of water and water solutions of some kosmotropic and chaotropic additives on the association degree of methyl orange with reverse micelles was studied. Association degrees of MO with Brij30 reverse micelles were calculated by absorption data of MO at wavelengths of 408 and 416 nm in 0.13 M Brij30 solution in hexane at different water/surfactant ratio (W).

The existence of three types of water is revealed by dependence of methyl orange absorption maxima versus water content in the nanocages of reverse micelles. Different influence of kosmotropic and chaotropic ionic and non-ionic additives on the formation of free water in water core of reverse micelle was observed, viz. the formation of free water in water core of reverse micelle begins at different W in the presence of urea as compared with an additive of glucose. Analogous picture is observed in the presence of ionic additives.

References:

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