The solubilization of hydrotropic additives in micellar solutions of cationic surfactants

Alla Mirgorodksaia¹, Rushana Kushnazarova², Alina Bekmukhametova², Gulnara Gaynanova¹,², Lucia Zakharova¹,²

¹A.E. Arbuzov Institute of Organic and Physical Chemistry, Kazan Scientific Center, Russian Academy of Sciences, Kazan, Russia
²Kazan National Research Technological University, Kazan, Russia

mirgoralla@mail.ru

Due to the ability to integrate with the lipid bilayer and solubilize hydrophobic molecules surfactant solutions considered as promising carriers of drugs and food supplements. In this case, change of surfactant aggregation characteristics can be observed, in particular, change of the values of critical micelle concentration (cmc) and size of aggregates. In this work, as the objects of investigation series of cationic surfactants with bulky head groups (morpholinium, triphenilphosphonium, and derivative of diazobicyclo[2.2.2]octane) and hydrophobic cetyl tail were selected. Choline, thymol, and cholesterol were used as active additives. Hydrophobic dye Sudan I with characteristic band at 500 nm was chosen to estimate the solubilization capacity of supramolecular systems.

By the methods of tensiometry, conductometry, spectrophotometry, dynamic and electrophoretic light scattering the values of cmc, hydrodynamic diameter and zeta potential, solubilization capacity in the presence of choline, thymol, and cholesterol were obtained. The influence of the head group structure of cationic surfactant and the nature of the solubilizing agent on the main aggregation characteristics was testified. The competitive solubilization of the dye Sudan I showed that more intense dye solubilization was observed in surfactant - choline systems compare with the other mixed systems, which probably indicates good binding of thymol and cholesterol with a hydrophobic core of the micelles of cationic surfactants under study.

Acknowledgements. The work is supported by the Russian Foundation for Basic Research (Project 15-43-02490).