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Protolytic properties of some bis(dimethylaminomethyl)phenols in the presence of surfactants

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Abstract

Aggregation and protolytic properties of bis(dimethylaminomethyl)phenols containing methyl (HA) and nonyl (HL) substituents at the benzene ring are studied in aqueous solutions of isopropanol and various surfactants with potentiometric titration, tensiometry, and mathematical modeling of equilibria. Monomers, dimers, and tetramers of HA and HL are found. It is shown that the degree of compound aggregation depends on the solution concentration and pH. Sodium dodecyl sulfate and HA form associates, whereas SDS and HL form mixed micelles at the CMC-1 and CMC-2 critical micellization concentrations. In micellar solutions of Triton X-100 and cetyltrimethylammonium bromide, the mixed micelles are not found via tensiometry. Protonated species of tetramer, dimer, and monomer of investigated compounds are revealed, depending on the acidity of the medium. Phenolate forms of HA and HL do not exist under experimental conditions. Apparent protonation constants are determined and it is shown that, for the HA compound that does not form micelles, the protonation constants of the same-type species increase in the presence of the three surfactants used as compared to the water-isopropanol solution. Decreasing constants of analogous HL forms in the solutions of CTAB, nonionic surfactant ($C_{Tx} = 10 \text{ mM}$), and SDS ($\text{pH} > 7$) are attributed to the formation of associates or mixed micelles of this compound and surfactants under experimental conditions. © Nauka/Interperiodica 2006.

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