

Dependence of CMC of SDS micelles on Sodium Chloride and in the presence of some amino acids

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Detergents are organic amphipathic molecules containing “hydrophobic tail” and “hydrophilic head” groups. Critical micelle concentration (CMC) is known as the concentration of detergent in bulk at which micelles start to form. At above CMC, the detergent micelles are used as a solvent for structural studies of hydrophobic peptides/proteins in NMR spectroscopy. The CMC of detergents is a critical parameter and it determines the size of the molecular complex, which is a critical factor in NMR. In this research, sodium dodecyl sulfate (SDS) is used to study the CMC at variable NaCl concentrations and in the presence of polar, non-polar, and charged amino acids.

A conductivity method was used to determine the CMC of SDS at different conditions at ~30 °C. The CMC of SDS was obtained in water and in the presence of different concentrations of Gly, Asp, Glu, Lys, Leu, and Trp, in water with and without NaCl as the added salt.

The CMC of SDS in water was found to be 8.0 ± 0.5 mM. When increasing NaCl concentration the CMC of SDS decreases exponentially. Basic amino acid, Lys considerably decreased the CMC of SDS, and the effect is high in the presence of NaCl. In addition, acidic amino acids like Asp and Glu decreased the CMC of SDS by a factor of 3-4 compared to water. However, the effect of Glu on the CMC of SDS is negligible in the presence of NaCl. The aromatic amino acid, Trp and hydrophobic amino acid, Leu also decreased the CMC of SDS by a factor of 3. Moreover, we found that the CMC of SDS is not affected with the

concentration of Gly. It can be concluded that the CMC of SDS micelle is highly affected by most of the amino acids but not with Gly. In addition, it has a considerable effect on CMC of SDS in the presence of NaCl.

Key words: Critical micelle concentration, CMC, Sodium dodecyl sulphate, SDS