

Influence of the Nature of Counterions on Micellar Growth in Sodium Dodecyl Sulphate Solution

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Abstract — Structural transitions in organized assemblies of a surfactant, Sodium Dodecyl Sulphate (SDS) in presence of additives, were studied by viscometric measurements under Newtonian flow conditions. Bromides of Li, Na, K, Rb and Cs were used as additives at various concentrations of SDS micellar solution. The dependence of the changes in viscosity on the added counter ion and its nature was studied at 30°C. The competitive counter ion binding to SDS micelles was studied because it is a salt of a strong acid and cannot interact specifically through hydrogen bonds with adjacent water molecules. At 0.1 and 0.3 M SDS concentrations, more or less the same behaviour, i.e., a decrease followed by an increase in viscosity was observed, which was explained in terms of the balance of two opposing effects, the salt induced micellar growth and the transfer of the bound Na⁺ into the aqueous phase. The abrupt rise may be due to the small ionization degree and small attractive energy contribution. In 0.5 M SDS solution, solubility of the salts are reduced which can force them towards the micelle-water interface and this promotes the transition.
