

Interaction of Water-Soluble Ionic Amphiphiles with Insoluble Stearic Acid Amphiphile at Solid-Liquid Interface.

A. MITRA,[#] P. CHAKRABORTY and D. 3K. CHATTORAJ*

Department of Food Technology and Biochemical Engineering, Jadavpur University, Kolkata – 700032

Abstract - The extent of adsorption of long chain synthetic cationic and anionic surfactants on the surface of insoluble stearic acid (SA) powder has been studied at different physico-chemical conditions. The results have been presented in terms of adsorption isotherms and various thermodynamic parameters. Cationic surfactants like cetyltrimethylammonium bromide (CTAB) and myristyltrimethylammonium bromide (MTAB) can be adsorbed at the interface of insoluble stearic acid powder, where as in the case of anionic surfactant, sodium dodecyl sulphate (SDS), the excess positive hydration of stearic acid particle has taken place so that the adsorption of the surfactant becomes negative. All the isotherms for adsorption of cationic surfactants have similar features. Initially the extent of adsorption (Γ_2^m) increases with increase of surfactant concentration (C_2) in the bulk until it reaches the maximum value Γ_2^m . At very high values of C_2 , Γ_2^m again increases from value of Γ_2^m as a result of surface aggregation of adsorbates. Values of standard free energy change, ΔG° for adsorption of cationic surfactant per kg of stearic acid estimated on the basis of the integrated form of the Gibbs adsorption equation, are found to vary linearly with Γ_2^m . Standard free energy change, ΔG_b° for transfer of one mole of CTAB from bulk to stearic acid surface estimated from the slope of ΔG° vs Γ_2^m plot is 32 kJ mol^{-1} . The adsorption process is found to be partly entropy and partly enthalpy controlled.
