Name of Scholar : Nizamul Haque Ansari

Name of Supervisor : Prof. Anwar Ali

Department : Chemistry

Title of the Thesis : Thermophysical studies on interactions of amino acids and small peptides with surfactants in aqueous medium.

Abstracts

CHAPTER I. This is an introductory chapter. It embodies the scope and objective of the proposed work. An upto date literature survey has been presented to illustrate the work being carried out in this field. At the end of this introductory chapter, brief outlines of the work presented in subsequent chapters are given.

CHAPTER II. Experimental techniques, which have been used in the present investigations, are presented in the second chapter. Density, viscosity, conductance, ultrasonic velocity and fluorescence have been measured at different temperatures for pure solvents and ternary solutions.

CHAPTER III. Conductivities, κ , of (0.001 - 0.012) m sodium dodecyl sulphate (SDS) have been determined in water and in the presence of 0.10 m aqueous glycine/ alanine/ glycylglycine at 298.15, 303.15, 308.15, and 313.15 K. From the specific conductivity data, the critical micellar concentration, cmc, degree of counter ion association, α, degree of counterion dissociation, β, free energy of transfer of hydrophobic chain from the medium to interior of the micelle, ΔG^0_{HP}, and surface contribution, ΔG^0_S, standard free energy of micellization, ΔG^0_m, standard enthalpy of micellization, ΔH^0_m and standard entropy of micellization, ΔS^0_m, of SDS have been computed.

CHAPTER IV. Micellar behaviour of cationic surfactant, cetyltrimethylammonium bromide in presence of two different amino acids L-phenylalanine and L-tyrosine has been

investigated over the temperature range 298.15 - 313.15 K, as a function of surfactant concentration. The critical micelle concentration, cmc and degree of counter ion dissociation, β, of the micelles were determined from the conductivity measurements at different temperatures. Thermodynamic parameters, ΔG_m^0, ΔH_m^0 and ΔS_m^0 for the micelle system were estimated by applying the charged phase separation model.

CHAPTER V. The densities, ρ, viscosities, η and specific conductivites κ, of (0.0002, 0.0004, 0.0006 and 0.0008 m) CTAB in 0.1 m aqueous valine, leucine and isoleucine were measured at different temperatures. The apparent molar volumes, ϕ_v, partial molar volumes, ϕ^0_v and partial molar isobaric expansibilities, ϕ^0_E, were calculated using density data. The viscosity data were analyzed using Jones – Dole equation to obtain viscosity coefficients, A- and B-, free energy of activation per mole of solvent, $\Delta\mu_1^{0*}$, and solute, $\Delta\mu_2^{0*}$, enthalpy, ΔH^* and entropy, ΔS^* of activation of viscous flow. Moreover fluorescence study using pyrene as a photophysical probe has been carried out, the results of which support the conclusions obtained from other techniques.

CHAPTER VI. A number of thermodynamic parameters viz. apparent molar volumes, ϕ_v, partial molar volumes, ϕ^0_v, transfer volumes, ϕ^0_v (tr), partial molar expansibilities, ϕ^0_E, hydration number, n_H, apparent molar compressibilities, ϕ_K, partial molar adiabatic compressibilities, ϕ^0_K and limiting molar conductivities, Λ^o_m were calculated by using experimentally measured densities, ρ, ultrasonic velocities, u and specific conductivites, κ, of glycylglycine (0.02 – 0.10 m) in 0.005 m aqueous cetylpridinium chloride (CPC) and cetylpridinium bromide (CPB) solutions at 298.15, 303.15, 308.15 and 313.15 K.

CHAPTER VII. Interactions of glycine, dl-alanine and dl-valine with triton X-100 at different temperatures, 298.15, 303.15, 308.15, and 313.15 K are investigated by using the density and surface tension data.