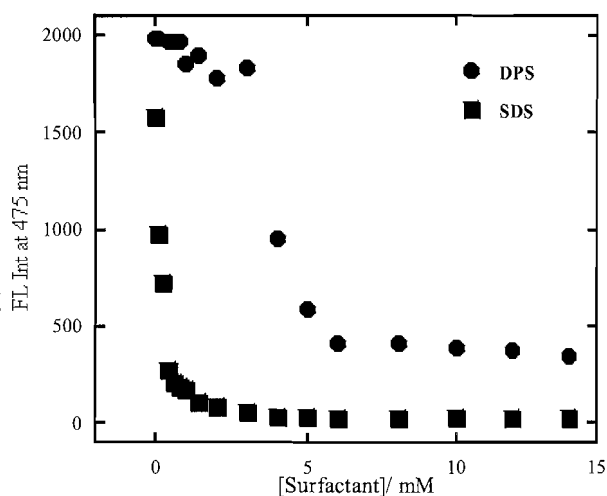


Conformational Changes of Bovine Serum Albumin in the presence of Zwitterionic and Anionic Surfactants

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Binding of surfactants with proteins leads to stabilization and destabilization of the proteins conformation with the result functional properties of proteins altered. It is therefore important to improve our understanding of the origin and nature of proteins-surfactants interactions. Bovine Serum Albumin (BSA) is a globular model protein, which functions biologically as a carrier for fatty acid anions and other amphiphiles in the blood stream. In this work, we are studying the conformational changes of BSA with zwitterionic surfactant dimethyldodecylammonio propane sulfonate (DPS) and anionic surfactant sodium dodecylsulfate (SDS) by using far-UV circular dichroism (CD), near-UV CD, tryptophan, 8-anilino-1-naphthalene sulfonic acid (ANS), I_3/I_1 pyrene intensity, and tryptophan-acrylamide quenching fluorescence measurements. Both surfactants have identical hydrocarbon tail but differ in their polarity and denaturing efficiency. In the presence of SDS and DPS, the ellipticity (θ) decreases with the increase of surfactants concentrations, which indicate the loss of secondary structure of BSA i.e. α -helicity. Near-UV data shows that the tertiary structure destabilizes up to some extent in SDS, where as tertiary structure remains intact in DPS. Tryptophan (Trp) fluorescence shows that Trp buried deeply as shown by the decrease in the Trp fluorescence intensity and the blue shift in the emission spectra in the presence of surfactants. An instantaneous change in the ratio of Trp fluorescence intensity in the premicellar concentration of SDS indicating unfolding completes below the critical micellar concentration (cmc). This behavior reflects the formation organized SDS structure at protein surface known as hemi-micelles, which is confirmed by the I_3/I_1 pyrene fluorescence intensity measurements. ANS binding assay shows the displacement of ANS from ANS binding sites of BSA to the polar medium in the presence of surfactants with the result fluorescence intensity of ANS decreased (see Fig.) and red shift in the emission spectrum is observed. Tryptophan-acrylamide quenching experiments shows that Trp is more exposed in solvent in comparison to the SDS and DPS denatured state. From thermal scan data, the mid point of thermal denaturation (T_m) evaluated and correlated with the surfactant concentrations. DPS seems not to be destabilizes BSA, where as SDS initial induce stability at low surfactant concentration (monomeric level) followed by destabilization of BSA below the cmc . This behavior shows that SDS monomers induce stability via interacting electrostatically with BSA opposite charged binding sites. As soon as hemi-micelles formed on the protein surface below the cmc , it destabilizes BSA with the result T_m decreases.



Plot of ANS fluorescence intensity vs. [Surfactant]