Interactions of Magnesium and Calcium Chloride with Lysozyme: Thermodynamic and Spectophotometric Approach

P. Patyar[S] and B.S. Lark
Department of Chemistry, Guru Nanak Dev University, Amritsar, India

T.S. Banipal[C]
Department of Applied Chemistry, Guru Nanak Dev University, Amritsar, India
tsbanipal@yahoo.com

High sensitivity differential scanning calorimeter and florescence spectrophotometer have been used to study the thermal denaturation of hen egg-white lysozyme in the presence of aqueous $MgCl_2$ and $CaCl_2$ solutions at pH values = 2.4, 4.5 and 6.0. Thermodynamic parameters accompanying the thermal transitions and calorimetric enthalpy have been evaluated. It is observed that thermal unfolding of lysozyme in the presence of both $MgCl_2$ and $CaCl_2$ follows a two-state denaturation mechanism as indicated by the equality of van't Hoff and calorimetric enthalpies. Further details of interactions have been determined from the partial specific volume of hen egg-white lysozyme at 298.15 K determined through precise density data. The preferential interaction parameters of lysozyme with co solutes have been determined by correlating the surface tension values of aqueous $MgCl_2$ and $CaCl_2$ solutions to the surface area of the protein.