

# Thermal denaturation of lysozyme in water-dimethyl sulfoxide mixtures as studied by differential scanning calorimetry

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## Abstract

© 2018 Nova Science Publishers, Inc. Thermal denaturation of hen egg white lysozyme in water-dimethyl sulfoxide (DMSO) mixtures was studied by differential scanning calorimetry (DSC). Dual action of DMSO on the lysozyme properties was observed. The temperature of denaturation ( $T_d$ ) decreases gradually with an increase in the concentration of DMSO. On the other hand, the enthalpy of denaturation ( $\Delta H_d$ ) shows a complex dependence on the solvent composition. The enthalpy of denaturation passes through a maximum with augmenting DMSO concentration. These results were interpreted in terms of the preferential interactions (preferential solvation and preferential hydration) of lysozyme with water-DMSO mixtures. The difference in preferential solvation of native and denatured states of lysozyme was estimated from the stabilization Gibbs energy data. It was found that the change in preferential solvation significantly depends on the temperature in the water-rich region. At low temperatures and small amounts of DMSO, the denatured state of lysozyme is more hydrated than the native one. At higher concentrations of DMSO and temperatures, the denatured state of lysozyme becomes more dehydrated than the native one.

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## Keywords

Dimethyl sulfoxide (DMSO), Lysozyme, Preferential solvation, Protein, Thermal stability

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