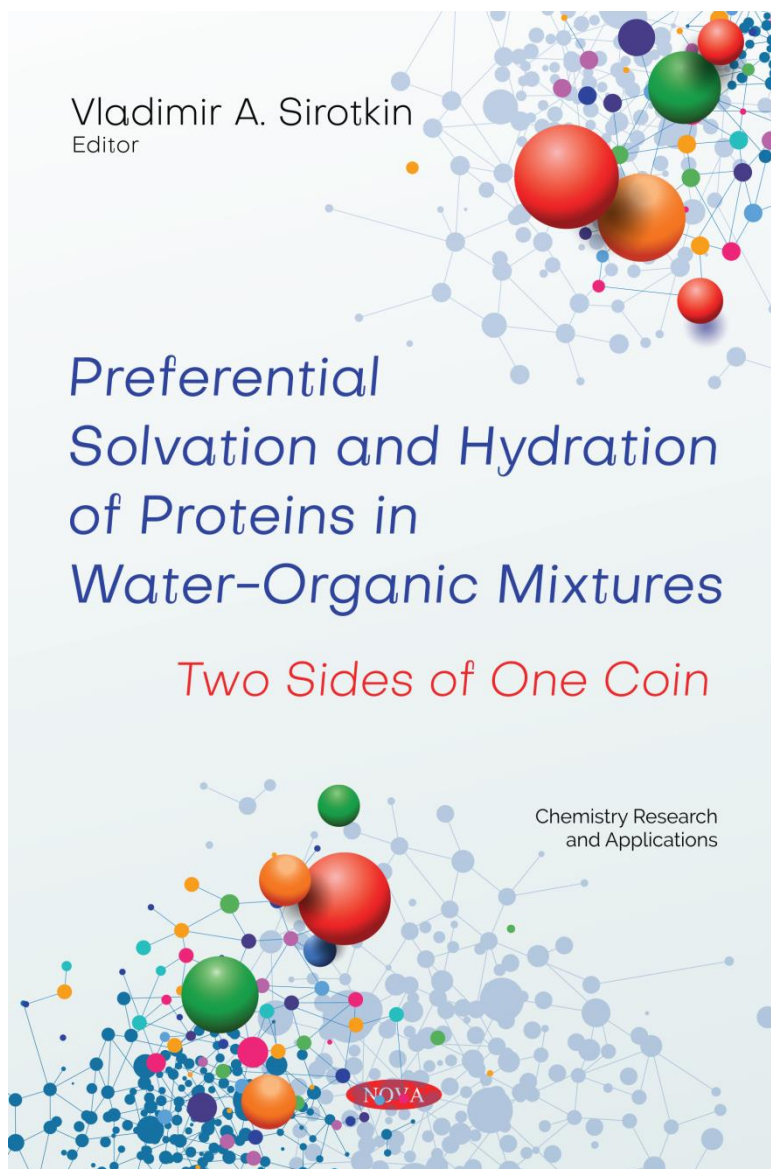


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Chapter 2

**Preferential Solvation of α -Chymotrypsin
IN WATER-MONOHYDRIC ALCOHOL
MIXTURES:
EFFECT OF CHAIN LENGTH**

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ABSTRACT

Preferential solvation and hydration of bovine pancreatic α -chymotrypsin was investigated in the entire range of water content in monohydric alcohols at 25°C. This approach is based on the analysis of absolute values of the water and monohydric alcohol sorption. One of the most important advantages of our approach is the facilitation of individual evaluation of the Gibbs energies of water, alcohol, and protein in the entire range of water content. This methodology was applied to estimate protein destabilization/stabilization of lysozyme in water-monohydric alcohol mixtures.

Three distinct schemes are operative in water-alcohol mixtures. α -chymotrypsin is preferentially hydrated at high water content. Protein has a higher affinity for alcohol than for water at intermediate water content. At low water content, preferential solvation of chymotrypsin depends significantly on

the alkyl chain length. Opposite to methanol, ethanol and propanol-1 are preferentially excluded from the protein surface at the lowest water content. This results in preferential hydration of α -chymotrypsin in the water-poor ethanol and propanol-1. Our data clearly show that the length of the alkyl chain of monohydric alcohols is one of the critical factors in determining the stability of protein-water-alcohol systems.

Keywords: preferential solvation, preferential hydration, α -chymotrypsin, water, alcohol, ethanol

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