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Thesis Title: Effect of Ionic Liquids on Protein Renaturation via Artificial Chaperone Mechanism.

Abstract

Ionic liquids, because of their fascinating properties have gained enormous attention in research field. Their low vapor pressure and tunable nature have rendered them as solvents with better properties than conventional solvents. The advantage of having tunable nature is exploited to design the ionic liquids of choice having desired physical and chemical properties. The variation in alkyl chain length of the organic cation or the change in the negative ion facilitates the possibility of increasing the hydrophobicity or hydrogen bonding capacity of the ILs. While ILs have plenty of applications, we were interested to study their effect on the refolding of chemically denatured proteins. From previous literature on the theme of “stability of proteins in ionic liquids” we came to know that a plethora of work and literature is available on the effect of imidazolium based ionic liquids on the stability of proteins. Some of the ILs have been able to stabilize the native state of the proteins while others have shown a tendency to destabilize the native proteins. Similarly, some imidazolium ILs have been successfully tested as refolding agents against chemically denatured proteins which mostly included lysozyme and cytochrome c. The research about the effect of pyridinium based ILs on the stability of proteins is still rare. We thus, choose to study the effect of pyridinium based ILs on the protein renaturation via artificial chaperone mechanism. The present thesis consists of following chapters

Chapter 1: Introduction

Chapter 2. Materials and methods.

Chapter 3. Ionic liquids as protein refolding agents (artificial chaperons) against chemically denatured bovine serum albumin.

Chapter 4. Refolding of chemically denatured beta lactoglobulin using butyl pyridinium bromide and octyl pyridinium bromide ionic liquids.

Chapter 5. Impact of pyridinium based ionic liquid on the native and chemically denatured zein

Chapter 6. Interaction of short chain pyridinium ionic liquids with hemoglobin

Chapter 7. Refolding of chemically denatured hemoglobin in presence of long chain pyridinium based ionic liquids