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A comparative study of the stability of Stem bromelain based on the variation of anions of imidazolium-based ionic liquids

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Abstract

There are numerous applications of ionic liquids (ILs) particularly in biology since, some of the ILs stabilizes the protein and augment enzyme activity while some of them have opposite effect. We have explored the influence of imidazolium-based ILs, 1-butyl-3-methylimidazolium chloride ([Bmim][Cl]), 1-butyl-3-methylimidazolium bromide ([Bmim][Br]) and 1-butyl-3-methylimidazolium iodide ([Bmim][I]) on the stability of stem bromelain (BM) using UV-visible spectroscopy, steady-state and thermal fluorescence, circular dichroism spectroscopy and dynamic light scattering (DLS) measurements. We attempt to understand the effect of imidazolium-based ILs on the stability of BM based on the variation of anion of the IL. All of these ILs acted as destabilizer for the native state of BM except at 0.01 M. The destabilizing behaviour of these ILs increased with increase in the concentration of ILs in the order of $\text{Cl}^- > \text{Br}^- > \text{I}^-$. On the other hand, anions are found to follow the well accepted Hofmeister series where the destabilization behaviour increased with increase in the chaotropicity or decrease in the kosmotropicity of the anion of the IL.

Keywords: Bromelain; Stability; biomolecular interactions; ionic liquids; Biophysical techniques

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