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Characterisation of Ionic Liquids and Their Ability to Stabilise Proteins

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Proteins are an important part of biotechnology and can be utilised for a range of applications and industries¹. But the stability and solubility of the protein is often a limiting factor, so ionic liquids (ILs) have been tested as an alternative solvent due to their wide scope and tailorable properties. They are reported to increase protein activity², solubility, long term and thermal stability. However, the relationship between the structure of an IL and how it interacts with proteins in solution is unknown.

In this study 52 ammonium based ILs and 14 common salts were prepared with HEWL and human lysozyme. Physicochemical, and thermal properties of the neat ILs were characterised, while SAXS was used to characterise protein stability. High concentrations of IL (>50 mol%) were often not conducive with the native structure of the protein, while lower concentrations (1-10 mol%) can support native protein structures with minimal to no aggregation. It was also found that additional alkyl chains on the cation, and the presence of hydroxyl groups reduced lysozyme's radius of gyration, preserving its native structure.

1. Egorova, K. S.; Gordeev, E. G.; Ananikov, V. P., Biological Activity of Ionic Liquids and Their Application in Pharmaceutics and Medicine. *Chemical Reviews* 2017, 117 (10), 7132-7189.
2. Mann, J. P.; McCluskey, A.; Atkin, R., Activity and thermal stability of lysozyme in alkylammonium formate ionic liquids—influence of cation modification. *Green Chemistry* 2009, 11 (6), 785-792.

Level of Expertise

Student

Presenter Gender

Man

Pronouns

He/Him

Which facility did you use for your research

Australian Synchrotron

Students Only - Are you interested in AINSE student funding

Yes

Do you wish to take part in the Student Poster Slam

Yes

Condition of submission

Yes

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