

## **On the Molecular Basis of the Salting in of Ionic Liquids (And Other Molecules) in Aqueous Solution**

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For ages the enhanced/decreased solubility of compounds in aqueous solution, commonly known as salting in/out, is known to follow the Hofmeister series and has been conceptualized by the Chaotropic/Kosmotropic model. According to it, salts affect the water structure making it more easy/difficult to solubilise a solute. This model has been seriously questioned during the last decade with a number of experimental and theoretical evidences showing it to be fundamentally flawed. Although the new conceptual model for the salting-out still puts its emphasis on the water-salt interactions the salting-in seems to be a totally different phenomenon. We have been interested in the molecular basis of salting-in and used the ionic liquids as model solutes to foster our understanding of it. Our results reveal a surprising picture dominated by the interactions between the salt ions and the ionic liquid hydrophilic moieties. Thermodynamic data, NMR spectroscopy and molecular simulation all provide evidence for a molecular level mechanism where the alkyl chain of the ionic liquid (both in the anion and cation) is preferentially solvated by the salt ions responsible for the salting-in observed. In this presentation we will discuss these results and their implications for the solubility of other charged molecules in aqueous salt solutions, such as aminoacids, proteins and drugs, and also on the use of ionic liquids for liquid-liquid extraction and chromatography.