

The Effect of the Salt on the Formation of Ionic-Liquid-Based Aqueous Two-Phase Systems

Shahla Shahriari

Department of Chemical Engineering, Shahr-e-Qods Branch, Islamic Azad University, Departamento de Química, CICECO, Universidade de Aveiro, 3810-193 Aveiro, Portugal, tehran, shahre qods, Iran

Catarina Neves, Mara G. Freire, and João Coutinho^{C,S}

*Departamento de Química, CICECO, Universidade de Aveiro, 3810-193 Aveiro, Aveiro, Aveiro, Portugal
jcoutinho@ua.pt*

In recent years, Ionic Liquids (ILs) have attracted the attention of the scientific community due to their unique properties. In addition to the large range of applications proposed in literature, ILs have been reported to be able to form Aqueous Two-Phase Systems (ATPS) when combined with inorganic salts in aqueous media. Albeit some studies have been devoted to the evaluation of the inorganic salt influence towards the formation of ATPS, few inorganic salts were investigated hitherto, and a complete and comprehensive analysis on the salting-out ability of conventional salts is still missing. Moreover, most of the authors stated that the Hofmeister series is always obeyed and explained their ranks based on the Gibbs free energy of hydration of the ions. Nevertheless, Freire et al.¹ have shown that the salting-out occurrence of ILs from aqueous media is driven by an entropic process resulting from the formation of water-ion complexes. Therefore, aiming at gathering a broader picture on the molecular mechanisms which govern the ability of ILs to form ATPS, in this work, a large series of organic and inorganic salts was evaluated. For this purpose, the ionic liquid 1-butyl-3-methylimidazolium trifluoromethanesulfonate that is easily salted-out (even by NaCl) was used, and the respective phase diagrams were determined at 298 K and atmospheric pressure. With the large body of data measured in this work a direct correlation was found between the ionic liquid ability for phase separation and the molar entropy of hydration of the ions, showing that this property, and not the Gibbs free energy of hydration is the driving force of this process.

Freire et al. *J. Phys. Chem. B* 113 (2009) 202-211.