

Three Approaches to Choose an Ionic Solvent

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Ionic solvents are constituted by ionic liquids or their mixtures and so are composed of large ions, flexible and asymmetric, with delocalization of electrostatic charge. They constitute a family of liquids with a diversity of chemical structures and interactions that leads to unique properties. Ionic solvents can also be structured, with persistent domains formed by aggregates of non-polar side chains and by a network of ionic groups. This segregation of polar and nonpolar domains determines the way in which solvation is understood in these media.

Ionic media are capable of dissolving or stabilizing different solutes or solid materials, ranging from gases¹ to biopolymers² or nanomaterials^{3,4}. Simple molecular compounds, gaseous at ambient conditions, have been used to assess the microscopic features (both structural and energetic) that control the dissolution process^{5,6}. These studies have been the starting point for the development of new ionic solvents capable of dissolving more complex solutes. In each case, the interactions between the solutes and the ionic liquids were evaluated experimentally using phase equilibria measurements and calorimetry techniques, the dissolution mechanisms being investigated spectroscopically or by molecular simulation. It will be shown that one or several effects govern the dissolution or stabilization of the solutes in the ionic solvents – their molecular interactions, the transport properties of the liquid or the arrangement of the solvent around the solute.

1 J. Jacquemin, P. Husson, V. Majer and M. F. C. Gomes, *Fluid Phase Equilibria*, 2006, **240**, 87–95.

2 J. M. Andanson, A. A. H. P. X. dua and M. F. C. Gomes, *Chem. Commun.*, 2015, **51**, 4485–4487.

3 A. Podgorsek, A. S. Pensado, C. C. Santini, M. F. Costa Gomes and A. A. H. Padua, *J. Phys. Chem. C*, 2013, **117**, 3537–3547.

4 J. Szala-Bilnik, M. F. Costa Gomes and A. A. H. Padua, *J. Phys. Chem. C*, 2016, **120**, 19396–19408.

5 M. F. Costa Gomes, L. Pison, A. S. Pensado and A. A. H. Padua, *Faraday Discuss.*, 2011, **154**, 41.

6 N. Giri, M. G. Del Pópolo, G. Melaugh, R. L. Greenaway, K. Rätzke, T. Koschine, L. Pison, M. F. C. Gomes, A. I. Cooper and S. L. James, *Nature*, 2015, **527**, 216–220.

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