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ILS3

Structurally modified alkylimidazolium ionic liquids in aqueous and aqueous-salt solutions

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Ionic Liquids (ILs) occupy a special place among solvents. Their well-known features, such as a wide liquid range, low volatility, high thermal stability etc., make many ILs promising, in particular, as an alternative to traditional organic solvents in liquid-liquid extraction of high-value substances [1]. Aqueous biphasic systems (ABSs) that may provide more eco-friendly extraction media are of special interest. In 2003, Rogers and co-workers, for the first time, used the ABSs formed by adding inorganic salts to water-miscible ILs [2]. By varying the chemical structure of ILs it is possible to obtain the required change in their properties (phase behavior, extraction capacity, self-organization etc.). Among the modified ILs, ILs with amino acidic anions attract attention, particularly due to their low toxicity and likely biocompatibility [3]. Recently, polymerized ILs have been shown to be promising agents for enhanced bioextraction [4].

In this work, we obtain new data (viscometry, light scattering, titration calorimetry, LLE studies) and analyze structural and phase behavior of aqueous and aqueous-salt solutions of 1-alkyl-3-methylimidazolium ILs with different amino acid anions (leucinate, lysinate and valinate) in comparison with the behavior of the halide ILs based systems. Partitioning of L-tryptophan (taken as a model biocompound) between the liquid phases is studied in these ABSs. ILs with bromide anion and modified cation, 1-butyl-3-vinylimidazolium and poly(1-butyl-3-vinylimidazolium), Figure 1., is considered next. Special attention is given to the structural behavior of this highly amphiphilic polyelectrolyte in aqueous-salt media.

We conclude by discussing structural design of ILs to control phase split in the ABSs and to improve the performance of liquid-liquid extraction systems.

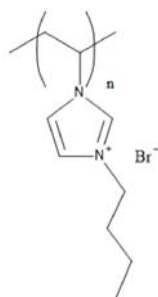


Figure 1. Chemical structure of poly(1-butyl-3-vinylimidazolium) bromide.

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