

Proton Transfer Reactions in Ionic Liquids

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Ionic Liquids (ILs) have been recently subject of intense studies due to an increasing demand for replacing toxic, flammable, volatile liquids in industrial processes. Therefore, many organic reactions (e.g Diels- Alder, Friedel-Crafts acylation, osmylation, Heck coupling, etc.) have been carried out in this group of solvents. However, proton transfer reactions in ILs have received little attention. Thomazeau *et al.* [1] established a Brønsted acidity scale of IL solvents by analyzing the absorption spectra of an acid-base indicator in mixtures of strong acids with ILs. Later, MacFarlane *et al.* [2] analyzed qualitatively the basicity of IL anions by studying the absorption spectra of acid base indicators of different acidity constants. In spite of that, none of these authors analyzed the magnitude of proton transfer reactions in ILs in comparison to the observed behavior in other solvents, e.g water. In this work we study the equilibrium constants of proton transfer reactions in bmimBF₄ (1-butyl-3-methylimidazolium tetrafluoroborate) by the analysis of the absorption spectra of a weak acid (bromophenol blue), whose protonated and unprotonated forms have distinctive spectra. The obtained results are compared with the equilibrium constants determined in water and with previous qualitative determinations. It can be concluded that the magnitude of proton transfer reactions in ILs solvents differs by various orders of magnitude from what is observed in water. Proton transfer reactions in ILs were also analyzed by measuring the absorption and fluorescence spectra of a photoacid (pyranine), whose acidity constant varies various orders of magnitude after photoexcitation.