

Aqueous Biphasic Systems Composed of Two Ionic Liquids: a New Plethora of Separation Platforms

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In recent years, ionic liquids (ILs) have shown to be able to form aqueous biphasic systems (ABS) in the presence of salts, amino acids, carbohydrates or polymers [1]. Furthermore, it has been shown that it is possible to tune the polarity and affinity of the coexisting phases in IL-based ABS by an adequate manipulation of the chemical structure of the IL ions [2]. Nevertheless, the polarity of the opposite IL-rich layer is always more restricted since it is usually composed of high charge density salts or of more hydrophobic polymers. In this context, the tailoring ability of IL-based ABS can be expanded by the combination of two ILs in aqueous media. In this work, novel ABS composed of two ILs were investigated. The binodal curves, and respective tie-lines, tie-line lengths and critical points were determined at 298 K. Several combinations of ILs, ranging from imidazolium-, phosphonium- and cholinium-based, were investigated. The partition coefficients of a series of dinitrophenylated (DNP) amino acids were also determined allowing to confirm the boost on the relative hydrophobicity of the coexisting phases achieved by IL-IL ABS. These novel liquid-liquid systems represent a relevant improvement on separation processes allowing thus for more specific and efficient extractions by the proper choice of the phase-forming components, which are ILs, of a given ABS.