Ionic Liquids for Technological Applications: Extraction, Absorption and Dissolution Processes

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Abstract

Solvents are major contributors and high on the list of environmental damage chemicals, mainly because of their large usage and high volatility. The widespread use of volatile organic compounds (VOCs) in many industrial chemical processes is an issue of great environmental concern. It is an extremely important task to search of potentially green and environment friendly alternatives for VOCs. At least a partial solution to this problem may offer by a novel class of molten salts referred to as ionic liquids (having melting point, generally, below boiling point of water), as they possess unique combination of particular properties, unlike molecular liquids, namely negligible vapour pressure (~ 10^{-11} to 10^{-10} bar at room temperature), wide thermal window (~ -50 °C to +250 °C), wide electrochemical window (~ ±3 Volt vs. NHE), non-flammability, high ionic conductivity and a highly solvating capacity for organic, inorganic and organometallic compounds. This unique combination of particular properties leads them to be exploited as "green solvents" and giving them increasing attention in academic and industrial research. The research areas on ionic liquids are growing very rapidly and the potential application are numerous, mainly due to the fact that simple changes in the cation and anion combinations or the nature of the moieties attached to each ion allow the physical properties of ionic liquids such as hydrophobicity, viscosity, density, coordinating ability, ion selectivity, and chemical and electrochemical stability to be tailored for specific applications. Proposed talk will include the introduction of green solvents, ionic liquids, general applications of ionic liquids and understanding unique thermophysical properties of novel ionic liquids [1-4] for metal ion extraction [5], solar refrigeration system [6], dissolution of tank bottom sludge [7-9] and dissolution and stability of biomolecules [10]. Further, the effects of thermophysical properties of ionic liquids on these applications and current research trends on ionic liquids as green solvents for the technological applications will be discussed.

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