

Summary of Ionic Liquids

Ionic liquids are organic salts that are liquid below 100 °C. As opposed to molten salts (high melting e.g. NaCl: 800°C; highly viscous and corrosive), ionic liquids are non corrosive and of low viscosity. Typical cation- anion combinations for ionic liquids are:

Cations: imidazolium, pyridinium, ammonium, phosphonium...
Anions: halides, BF₄⁻, PF₆⁻, NO₃⁻, AlCl₄⁻, Al₂Cl₇⁻....

general properties of ionic liquids:

- good solvents for a large variety of organic as well as inorganic substances
- polar, many are weakly coordinating
- immiscible with many commonly used solvents
- low vapour pressure (stable in high vacuum)
- no toxic and potentially explosive gas above the solvents.
- low melting point
- high thermal stability (up to 300-400°C)

relations between properties and structures of ionic liquids:

- the density and melting point is related to the R groups of the organic cation.
- the viscosity is directly related to the H-bonding & Van der Waals interactions,
- the acidity and coordination properties of ionic liquids are determined by the nature of its anion

applications:

- solvents for organic synthesis, especially for homogeneously catalysed reactions
- substitution of dangerous organic solvents (“**green solvents**”)
- biphasic or triphasic mixtures can be produced for special applications, e.g. better separation of products
- they extend a life of the very expensive Pd catalyst used in hydrogenation reactions and increase the rate of reaction simultaneously

References:

1. Peter Wasserscheid & Wilhelm Keim / Angew. Chem. Int.Ed. 2000 / Ionic Liquids / March 15, 1999 / 39. 3772-3789
2. http://www.sigmaaldrich.com/Brands/Fluka___Riedel_Home/Organic___Synthetic/Ionic_Liquids.html
3. http://en.wikipedia.org/wiki/Ionic_liquid
4. www.cseng.org.uk
5. http://en.wikipedia.org/wiki/Ionic_liquid
6. www.esi-topics.com/ionic-liquids
7. www.ionicliquids.net