Ionic Liquids: Solvents for sustainable chemistry

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Since the introduction of ionic liquids that are air and water stable nearly 20 years ago, there has been an ever increasing interest in the use of ionic liquids for chemicals production. Much of the justification of this has been that ionic liquids are ‘Green Solvents’. This in turn largely rested on the (once believed) non-volatility of ionic liquids and its associated properties (low flammability, ease of containment etc.). This claim to be a Green Solvent has since been challenged on several occasions, particularly with the toxicity and environmental persistence of the most widely used ionic liquids being noted as important negative green factors. In response to these challenges ionic liquids have been being designed for low toxicity and biodegradability.

However, any process solvent should be judged in terms of the overall environmental impact of the process that it is a part of. For instance, we would now recognise that if the use of a more hazardous solvent gave significant improvements to the total environmental impact of the overall process than a less hazardous alternative, then the greener choice is the former. Similarly, one could imagine a situation wherein a commercial product may have its overall environmental impact reduced by using a more hazardous liquid than a less hazardous one. So, if there is no such thing as an intrinsically green solvent.

What we are really interested in doing is creating a more sustainable chemicals industry and a big part of this is the introduction of more sustainable processes. In this ionic liquids have already achieved important successes and more will follow.