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Novel green solvents: Selected applications

Inas M AlNashef

Khalifa University, UAE

Abstract

Solvents play an important role in green chemistry and engineering. Availability, non-toxicity, biodegradability, recyclability, non-flammability and low price are among important factors that need to be taken into consideration when deciding whether a solvent is green or not. Up to now, the number of available green solvents is rather limited. Ionic liquids (ILs) have attracted considerable attention in many fields of scientific research. ILs have favourable characteristics, e.g. low volatility, non-flammability, thermal stability, etc. ILs have been applied in many applications including electrochemical, separation, biochemical, catalysts and many other applications. The toxicity and poor biodegradability of many ILs have been reported in the literature. ILs with high purity was also required since impurities, even in trace amounts, affect their physical properties. Additionally, their synthesis is far to be environmentally friendly. To overcome these drawbacks, a new generation of solvents, named Deep Eutectic Solvents (DES), has emerged as alternative to ILs in many applications. Formation of these DESs can be obtained by simply mixing together two or more components that can be chosen to be cheap, renewable and biodegradable. These compounds are capable of forming a eutectic mixture with a melting point lower than that of each individual component. DESs are generally liquid at temperatures lower than 100°C. Many DESs have similar physical-chemical properties to those of ILs, while being much cheaper and environmentally friendlier. In this work, author discusses and selected applications for ILs and DESs relevant to different industries, e.g. Separation, desulfurization, wastewater treatment and desalination etc.

Biography

Inas M AlNashef received his PhD in Chemical Engineering from University of South Carolina, USA in 2004. He joined King Saud University, Saudi Arabia, in 2004. In 2011, 2019 he was promoted to Associate Professor, Professor respectively. He was very active in research related to green engineering and sustainability. He moved to Abu Dhabi (UAE) where he is now a Professor in the Department of Chemical Engineering at Khalifa University of Science and Technology. He was co-authored more than 120 journal publications. He received eight patents from US and EU Patent Offices.

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