

RECOVERY OF IONIC LIQUIDS FROM AQUEOUS EFFLUENTS USING ALUMINIUM-BASED SALTS

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Abstract:

The use of ionic liquids as novel solvents in a wide range of applications has been increasing in the past few years. However most ionic liquids are either water soluble or present a non-negligible miscibility with water. In this context, if ionic liquids are envisaged to be produced and used in a large scale they will inevitably be present in wastewater streams and pose additional environmental risks. Ionic liquids present different levels of toxicity and biodegradability which mainly depend on their ionic structure. Therefore, besides the recommended use and exploitation of more environmentally benign fluids, their recovery from aqueous effluents is a vital topic of research, yet poorly explored.

Aqueous biphasic systems (ABS) can be used to concentrate solutes that are soluble in aqueous media. Thus, the addition of salting-out inducing salts to aqueous solutions containing ionic liquids can be used to remove and recover them from aqueous solutions. In this work, distinct ABS were studied combining several ionic liquids and aluminium-based salts usually used for water treatment. Several phosphonium, pyridinium- and imidazolium-based ionic liquids combined with diverse anions were investigated. The gathered results indicate that the recovery of ionic liquids, for all the systems tested, was above 90 %, and that for most of the systems studied, recovery efficiencies of ~100 % were attained. The results obtained are very promising for further and practical applications on the recovery and treatment of waste water streams contaminated with ionic liquids, making thus applications with ionic liquids more environmentally friendly.