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Salt extraction versus ion exchange

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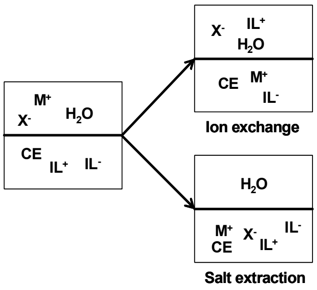
Ionic liquids (ILs), with or without crown ethers, can be used to recover metal salts from aqueous phases to prevent a shortage in the future. One of the major problems when ILs are used for this separation process is the occurrence of ion exchange. In this case some cations of the IL are exchanged for some of the cations of the metal salt. Not only does ion exchange causes the loss of the IL, but it also generates a new hydrophilic IL, that is often more toxic than conventional solvents.

Some ILs give prevalence to the desired salt extraction, whereas others seem to have ion exchange as prevailing mechanism (see fig 1). In this work, a large number of ILs and crown ethers have systematically been investigated on their separation mechanism (ion exchange or salt extraction) and efficiency as a function of the molecular structure of the IL. For example imidazolium NTf_2 based ILs with large alkyl chains have mutual extraction as prevailing mechanism, whereas shorter alkyl chains give rise to ion exchange. This is of importance for the applicability of the metal salt extraction process, as a large bleach of toxic hydrophilic IL into the aqueous phases can severely limit the possibilities of application.



The various trends will be discussed at the conference and further results and data will be presented.

Keywords: Desalination, Ion exchange, Metal extraction