

Use of Ionic Liquids in Produced Water Clean Up

Ionic liquids are a novel form of solvent that have unique properties such as low vapor pressure, high ionic strength but low ability to form coordination compounds, and are liquid under ambient conditions.

Their special properties have lead to research for application in a number of areas, including environmental. In this project, the use of ionic liquids in produced water remediation is being investigated.

As a first step, the distribution coefficients of prototypical organic contaminants between water and ionic liquids have been measured. The organic contaminants studied to date are hexanoic acid, 1-nonanol, toluene, butane diol and other fatty acids. The properties of ionic liquids, such as hydrophobicity and solubility, can be modified by changing the cation and anion, tailoring the IL for a particular application.

Hence, in the current series of tests, three different ionic liquids were selected for investigation, butylmethylimidazolium bistrifluoromethylsulfonyl amide - bmim Tf₂N, octylmethylimidazolium Tf₂N – omim Tf₂N, and bmim PF₆.

Measured distribution coefficients (concentration in the ionic liquid divided by concentration in the aqueous phase) ranged from 100 to 800 for toluene and for 1-nonanol. The uptake of butane diol and the fatty acids was marginal in the ionic liquids tested. The highest distribution coefficients were observed with omim Tf₂N. The distribution coefficients for hexanoic acid and 1-nonanol appeared to be pH sensitive; higher for the hexanoic acid at low pH, and higher for 1-nonanol at high pH. This pH sensitivity may assist in regenerating the ionic liquid.

The work will continue with studies of regeneration, saturation, and investigation of uptake of alkanes and fatty acids into ionic liquids.

[Read more about this work.](#)

