



Experimental screening towards developing ionic liquid-based extractive distillation in the dearomatization of refinery streams



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ARTICLE INFO

Keywords:

Ionic liquids
Aromatic/aliphatic separation
Vapor-liquid-liquid equilibrium
Extractive distillation

ABSTRACT

Ionic liquids (ILs) are potential neoteric solvents to design new advanced separation processes. Among several separation cases studied so far, the good performance of ILs regarding the dearomatization of liquid fuels, i.e. pyrolysis and reformer gasolines, has received especially attention. Indeed, a wide number of works has been done to characterize the phase equilibria for {aliphatic + aromatic + ILs} systems as well as the IL thermo-physical properties, concluding in the development of a liquid-liquid extraction process. However, this technology seems not to be enough to fulfill current aromatic commercial standards nor potential incoming restrictions for aromatic content in liquid fuels as a result of its low separation effectiveness for extreme aliphatic and aromatic purification. Extractive distillation with ILs stands as a new process configuration to overcome these limitations by enhancing the aliphatic/aromatic relative volatilities. In this work, an IL experimental screening in the *n*-heptane/toluene separation was done to further develop this new IL-based technology. Nine ILs were tested as mass agents in a wide range of conditions, i.e. solvent to feed (S/F) ratios from 1 to 10 and temperatures from 323.2 to 403.2 K. The required vapor-liquid-liquid equilibria (VLE) data were obtained by an experimental procedure based on headspace gas chromatography (HS-GC) developed in the framework of this work. Although all pre-selected ILs have shown good performance, tricyanomethanide-based ILs have been the most promising mass agents.

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<https://doi.org/10.1016/j.seppur.2018.03.024>

Received 23 January 2018; Received in revised form 12 March 2018; Accepted 12 March 2018

Available online 14 March 2018

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