Dearomatization of Pyrolysis Gasoline with an Ionic Liquid Mixture: Experimental Study and Process Simulation

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The pyrolysis gasoline is the main source of benzene, toluene, and xylenes. The dearomatization of this stream is currently performed by liquid–liquid extraction using sulfolane. However, the sulfolane process has high operating costs that could be minimized by employing ionic liquids as solvents because of their non-volatile character. In this work, we proposed a novel process to perform the dearomatization of pyrolysis gasoline using a binary mixture of 1-ethyl-3-methylimidazolium tricyanomethanide ([emim][TCM]) and 1-ethyl-4-methylpyridinium bis(trifluoromethylsulfonyl)imide ([4empy][Tf_2N]) ILs. The composition in the IL mixture was optimized considering their extractive and thermophysical properties. The Kremser method was applied using the experimental data to determine the number of equilibrium stages in the liquid–liquid extractor which provides the same extraction yields of aromatics using the IL mixture that those of the sulfolane process. The recovery section was designed and simulated from the experimental vapor–liquid equilibrium between the hydrocarbons and the IL mixture. © 2017 American Institute of Chemical Engineers *AIChE J*, 63: 4054–4065, 2017
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