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Design of extraction process of aromatic from aliphatic hydrocarbons using mixture of organic solvent and ionic liquid

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The main objective of this work is to study the impact of substitution of certain traditional organic solvents by other green solvent such as ionic liquid for the extraction of aromatic hydrocarbons from their mixture with aliphatic hydrocarbons. The heptane - benzene mixture was chosen as model system. Three benzene extraction processes have been proposed using: organic solvent "sulfolane", ionic liquid [BMIM] [SCN] and the mixed two solvents ionic liquid and organic solvent. A study of liquid-liquid equilibrium of selected systems was achieved using Simulis Thermodynamics software by the regression of binary interaction parameters. The results showed that the UNIQUAC model can accurately describe the thermodynamic behavior of the ternary mixture. The simulation results showed that the ionic liquid [BMIM][SCN] has a higher distribution coefficient and a best selectivity compared to sulfolane. We note that the solvent flow rate go through a minimum at 50% in mass of benzene in the feed mixture and in the case of mixed solvent that minimum disappears at a concentration of 10% in mass of [BMIM] [SCN] in the solvent mixture. We perceive that the separation is easy for a mixture containing 30% to 60% of benzene, in this concentration range the amount of solvent necessary to achieve a yield of 99% using the ionic liquid is from 1.2 to 2 times lower than the amount of sulfolane used in the conventional extraction. Whereas the amount of solvent used in the case of mixed solvent is 1.5 to 4 times lower than that of sulfolane.

Biography:

Hassiba Benyounes has been an assistant professor in the Department of Chemical Engineering of University of Science and Technology of Oran, Algeria, since 2004. She received her PhD degree in chemical engineering in 2003 from State Academy of Fine Chemical Technology M.V. Lomonossov. She is a member of Laboratory of Physical Chemistry, Material, and Environment in Algeria and collaborates with the research group of Prof. Xavier Joulia at the Laboratory of Chemical Engineering of Toulouse. Her research field concern modeling and simulation in process system engineering, with particular interest in design and development of extractive distillation.