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Low Transition Temperature Mixtures as Extractants in Liquid-liquid Extraction

Nerea R. Rodriguez¹, Blanca Santacruz¹, Maaïke C. Kroon¹

¹Separation Technology Group, Department of Chemical Engineering and Chemistry, Eindhoven University of Technology, Den Dolech 2, 5600 MB Eindhoven, The Netherlands

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Corresponding Author: Nerea R. Rodriguez; N.Rodriguez@tue.nl

Abstract

The separation of azeotropic mixtures is a well-known challenge in the separation technology field. Azeotropic/extractive distillation and liquid-liquid extraction are the main options to separate this type of mixtures. Polar organic solvents have traditionally been used as extraction agents in liquid-liquid extraction. However, these solvents are generally volatile, toxic and flammable.

In the last years, ionic liquids (ILs) have successfully been applied in the separation of azeotropic mixtures via liquid-liquid extraction [1]. However, ILs are generally costly, corrosive, toxic and non-biodegradable. Furthermore, most ILs are produced from non-renewable sources. Low transition temperature mixtures (LTTMs) are a new class of ILs analogues that share the promising solvent characteristics of ILs, with additional advantages such as low price and easy synthesis with no purification required [2]. Therefore, LTTMs have recently been used as extraction agents in liquid-liquid extraction, mainly in the separation of aromatic/aliphatic systems [3-5].

In order to investigate the applicability of LTTMs in the separation of azeotropic mixtures, the liquid-liquid equilibrium (LLE) of the ternary system alcohol-aliphatic-LTTM has been measured under various operating conditions. LTTMs composed of natural acids and choline chloride were selected for this work. High distribution coefficients, high selectivities and hardly any solvent losses were achieved.

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