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Extraction of basic nitrogen-containing compounds from gasoline using cholinechloride/glycerol deep eutectic solvent: Insight from phase equilibrium data

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In response to stringent regulations aimed at preventing environmental pollution, nitrogen-containing impurities have to be removed from transportation fuels, including gasoline. In this context, deep eutectic solvents (DES) have been recently identified as credible green candidates for denitrogenating liquid fuels. In this work, the ability of choline chloride/glycerol DES as a denitrogenation solvent for model gasoline was investigated at 295.15 K and atmospheric pressure. Experimental liquid-liquid equilibrium data for heptane + pyridine or quinoline + choline chloride/glycerol DES were determined using the equilibrium cell method. Heptane served as a model for gasoline while nitrogen-containing impurities consisted of pyridine and quinoline.

Choline chloride/glycerol DES showed greater extraction potential for pyridine than quinoline. However, calculated selectivities and distribution coefficients indicated that the studied DES is a promising denitrogenation agent in both cases. Subsequently, the experimental data were successfully correlated by means of the non-random two-liquid (NRTL) model. The root mean square deviations (RMSD) between calculated and experimental compositions were 0.0457 and 0.0458 for heptane + pyridine + choline chloride/glycerol DES and heptane + quinoline + choline chloride/glycerol DES, respectively.

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