

热力学

[Bmim] BF₄-H₂O-Na₂CO₃离子液体双水相体系液液相平衡数据的测定与关联

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摘要 用浊点法测定了四氟硼酸1-丁基-3-甲基咪唑—水—碳酸钠体系在常压30℃下的溶解度曲线及密度曲线,并用经验方程进行了关联。用浊点—密度法测定了该体系的液液相平衡数据,绘制了相应的相图。结果表明:双水相体系一相以离子液体和水为主,碳酸钠的含量很少,另一相以碳酸钠和水为主,离子液体的含量很少。该体系既可作为萃取分离体系,也可作为从水溶液中分离回收离子液体的初步体系。用Othmer-Tobias+Bancroft经验方程对相平衡数据进行关联,最大相对误差为94.99%,最大平均相对误差为15.69%,关联结果不理想。提出用Othmer-Tobias经验方程+溶解度方程对其进行关联,最大相对误差为4.52%,最大平均相对误差为2.77%,关联精度较高,该方法可适用于有一组分含量较低的体系的液液相平衡的关联计算。

关键词 [离子液体](#) [双水相](#) [溶解度](#) [液液相平衡](#) [浊点-密度法](#)

分类号

Measurement and correlation of liquid-liquid equilibrium data for ionic liquid-based aqueous two-phase system of [Bmim] BF₄-H₂O-Na₂CO₃

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Abstract

The solubility curve and density curve of 1-butyl-3-methylimidazolium tetrafluoroborate-water-sodium carbonate system ([Bmim] BF₄-H₂O-Na₂CO₃) were measured with the turbidity titration method at 30℃ under atmospheric pressure and were correlated with empirical equations. The liquid-liquid equilibrium data of the system were measured with the turbidity-density method and the phase diagram was constructed. As shown by experimental results, one phase of the aqueous two-phase system was composed mainly of water and ionic liquid whereas the sodium carbonate concentration was very low, the other phase was composed mainly of water and sodium carbonate whereas the ionic liquid concentration was very low. The system could be used for extraction and separation. It could also be used for primary separation and recovery of ionic liquids from aqueous solution. Othmer-Tobias and Bancroft equations were used for correlation of the liquid-liquid equilibrium data, but the result was not satisfactory. The maximum relative error was about 94.99%, and the maximum average relative error was about 15.69%. A new method for the correlation by using Othmer-Tobias and solubility equations was proposed. The maximum relative error was about 4.52%, and the maximum average relative error was about 2.77%. The calculated results were in good agreement with experimental data. The method could be used for correlation of liquid-liquid equilibrium for the system with a low content of one component.

Key words [ionic liquid](#) [aqueous two-phase system](#) [solubility](#) [liquid-liquid equilibrium](#) [turbidity-density method](#)

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