

分离工程

CO₂ 萃取分离离子液体 [bmim] [PF₆] 与萘的高压相平衡

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摘要

采用紫外光谱在线检测的静态相平衡方法, 在温度313~333 K、压力8~20 MPa、萘的液相浓度0.0169~0.378 mol·kg⁻¹的范围内, 测定了CO₂+ [bmim] [PF₆] +萘三元系中萘在富含CO₂相的浓度。结果表明, 在所测温度和压力范围内, 萘在富含CO₂相的浓度随着温度的升高而减小, 随着压力的升高而增大, 而且随着萘在液相中的浓度的减小而减小。在一定的温度压力条件下, 萘在富含CO₂相的浓度与萘在液相中的浓度近似呈双对数线性关系。采用Chrastil缔合模型关联了所有溶解度数据, 平均相对偏差为14.9%。此外, 还探讨了CO₂萃取分离离子液体与高沸点有机物的操作模式, 发现釜式间歇操作较为适宜。

关键词

[离子液体](#) [二氧化碳](#) [萘](#) [溶解度](#) [相平衡](#)

分类号

High-pressure phase equilibria for separation of naphthalene from ionic liquid [bmim] [PF₆] by supercritical CO₂ extraction

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Abstract

The concentrations of naphthalene in CO₂-rich phase for the ternary system CO₂ + [bmim] [PF₆] + naphthalene were determined by a static method with online high-pressure ultraviolet detection, under the conditions of naphthalene molality in the liquid phase ranging from 0.0169 to 0.378 mol·kg⁻¹, and temperature 313—333 K, pressure 8—20 MPa. It was found that the naphthalene mole fraction in the CO₂-rich phase decreased with increasing temperature, increased with increasing pressure, and decreased with decreasing naphthalene concentration in the liquid phase. The logarithm of naphthalene mole fraction in the CO₂-rich phase was shown to be approximately linear, at the same temperature and pressure, with the logarithm of naphthalene concentration in the liquid phase. All the solubility data were correlated to the Chrastil's association model and the mean relative deviation was found to be 14.9%. Moreover, operation modes of supercritical CO₂ extraction were discussed base on the solubility data. It was found that batch operation was better than continuous operation for organics extraction from ionic liquids using supercritical CO₂.

Key words

[ionic liquid](#) [carbon dioxide](#) [naphthalene](#) [solubility](#) [phase behavior](#)

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