

High-Pressure Phase Behavior of CO₂ in the 1-Butyl-3-methylimidazolium ionic liquids containing cyanide anion

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The solubility of CO₂ in three ionic liquids which contains two different number of cyanide anions, 1-butyl-3-methylimidazolium dicyanamide ([c₄mim][N(CN)₂]), 1-butyl-3-methylimidazolium tricyanomethanide ([c₄mim][C(CN)₃]) was measured. The solubility of CO₂ was determined by measuring the bubble point pressure or cloud point pressure at the temperature ranges from 303.15 to 373.15 K in 10 K intervals. Also, the measured data were correlated with the PR-EoS incorporated with the conventional van der Waals one fluid mixing rule. The critical properties of ionic liquids were estimated using the modified Lydersen-Joback-Reid method. As a result, [c₄mim][C(CN)₃] has higher CO₂ solubility than [c₄mim][N(CN)₂]. It implies that the CO₂ solubility is affected by the number of cyanide anions contained in ionic liquid. From this result, it is concluded that the cyanide anion enhances the CO₂ solubility in ionic liquid and that the ionic liquid which contains more cyanide anion has higher CO₂ solubility.