

High-pressure solubilities of carbon dioxide in 1-butyl-3-methylimidazolium cation-based ionic liquids: [BMIM][Ac], [BMIM][Cl], [BMIM][MeSO₄]박광우, 임중성^{1,†}서강대학교; ¹서강대학교 화공생명공학과(limjs@sogang.ac.kr[†])

The solubility of CO₂ in three different 1-butyl-3-methylimidazolium ([BMIM]) cation-based ionic liquids: 1-butyl-3-methylimidazolium acetate ([BMIM][Ac]), 1-butyl-3-methylimidazolium chloride ([BMIM][Cl]), and 1-butyl-3-methylimidazolium methyl sulfate ([BMIM][MeSO₄]) was measured. The CO₂ solubility was determined by the measurement of the bubble-point or cloud-point pressure of the CO₂ + IL mixtures. The temperature and pressure ranges were 303.15 - 403.15 K and 0.39 - 34.55 MPa, respectively.

The results of this study show that the CO₂ solubility in ILs were strongly affected by the different type of anions and also increased with pressure, and decreased with temperature. The sequence of magnitude of the CO₂ solubility was [BMIM][Ac] >> [BMIM][MeSO₄] > [BMIM][Cl].

For correlating the experimental data, we used the PR-EoS with van der Waals one fluid mixing rule and the modified Lydersen-Joback-Reid method. The average absolute deviations of pressure (AAD-P) were 0.0335 for CO₂ + [BMIM][Ac], 0.0128 for CO₂ + [BMIM][Cl], and 0.0213 for CO₂ + [BMIM][MeSO₄] systems.