

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

The solubility of CO₂ was measured in three different 1-ethyl-3-methylimidazolium cation based ionic liquids: 1-ethyl-3-methylimidazolium acetate ([EMIM][Ac]), 1-ethyl-3-methylimidazolium chloride ([EMIM][Cl]), 1-ethyl-3-methylimidazolium methyl sulfate ([EMIM][MeSO₄]). The CO₂ solubility was determined by the measurement of the bubble-point or cloud-point pressure. The temperature range was from 303.15 to 403.15 K and the pressure range was from 0.45 to 48.6 MPa.

The results of this work show that the solubility of CO₂ in ionic liquids increased with pressure, decreased with temperature, and was also affected by the different anions. The solubility is determined by CO₂ mole fraction in ionic liquids, and the order of magnitude of the CO₂ solubility was found to be [EMIM][Ac] > [EMIM][MeSO₄] > [EMIM][Cl].

To correlate of the experimental data, we used PR-EoS with one fluid mixing rule and the modified Lydersen-Joback-Reid method. The average absolute deviations of pressure were 0.0231 for CO₂ + [EMIM][Ac], 0.0141 for CO₂ + [EMIM][Cl], and 0.0275 for CO₂ + [EMIM][MeSO₄] systems.