

A study on the CO₂ solubility in [BMM] cation based ionic liquids: [BMM][TFES], [BMM][BETI], [BMM][Cl]

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In this study, three different [BMM] cationic ionic liquids were selected for measuring high pressure CO₂ solubility. Solubility data were obtained by measuring the bubble point pressure of the mixture using a variable volume view cell. Experimental conditions were set at 10 K interval from 303.15 K to 373.15 K. The new solubility database for three ionic liquids were constructed by this work, and it is confirmed that CO₂ absorption capacity is better in order of [BMM][BETI], [BMM][TFES], [BMM][Cl]. From experimental data, thermodynamic modeling was correlated through Peng-Robinson equation of state and van der Waals one fluid mixing rule to predict CO₂ solubility for ionic liquids at various temperature and composition ranges. The critical properties and acentric factor of the ionic liquid were calculated using the modified Lydersen-Joback-Reid method. Also, the trend of CO₂ absorption capacity according to the change of molecular structure of ionic liquid was analyzed. As a result, it was confirmed that the more the fluorine atom in the anion part of the ionic liquid, it performed better in absorbing CO₂.