

A study on the CO₂ solubility in bis(pentafluoroethylsulfonyl)imide ([BETI]) anion-based ionic liquids: [EMM][BETI], [BMM][BETI], [HMM][BETI]

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We measured the CO₂ solubility in three different [BETI] anion-based ionic liquids: 1-ethyl-3-methylimidazolium bis(pentafluoroethylsulfonyl)imide ([EMM][BETI]), 1-butyl-3-methylimidazolium bis(pentafluoroethylsulfonyl)imide ([BMM][BETI]), and 1-hexyl-3-methylimidazolium bis(pentafluoroethylsulfonyl)imide ([HMM][BETI]) in the experimental ranges of 0.1–29.3 MPa and 303.2–373.2 K.

In this paper, we report the CO₂ solubility in three [BETI] anion-based ILs under various experimental conditions, and compare the effect of three different cations, [HMM], [BMM], and [EMM]. We determined the CO₂ solubility by measuring the bubble-point pressure for a fixed CO₂ mole fraction, and the order of intensity for CO₂ absorption ability was [HMM][BETI] > [BMM][BETI] > [EMM][BETI].

The Peng–Robinson equation of state (PR–EoS), the conventional van der Waals one fluid mixing rule and the modified Lydersen–Joback–Reid method were used to correlate and calculate the experimental data.

Keywords: CO₂ solubility, Ionic liquids, PR–EoS, [BETI] anion