

Novel modified Kent-Eisenberg model and equilibrium CO₂ solubility in aqueous 2-[2-(dimethylamino)ethoxy]ethanol

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Abstract

The equilibrium CO₂ solubility of 2-[2-(dimethylamino)ethoxy]ethanol (DMAEE) was investigated at the temperature range of 298.15-323.15 K with the CO₂ partial pressure from 5.0 to 60 kPa. A novel modified Kent-Eisenberg model was proposed to predict the CO₂ solubility of DMAEE with the absolute average deviation (ADD) of 3.0% in this work, and this model provides more accurate prediction than the reported Kent-Eisenberg, Austgen, Hu-Chakma, and Li-Shen model. Then four reported tertiary amines were used to validate the universality of the proposed model and the obtained results indicate that the developed model can be applied to the mentioned amines with an acceptable AADs (4.80, 5.47, 8.56, and 3.65 %). In addition, the heat of CO₂ absorption and the dissociation constant (pKa) also were systematically evaluated and compared with other reported amines, all obtained results indicates that the DMAEE has a potential to be an alternative absorbent for post-combustion CO₂ capture.

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