Thermodynamic modeling of CO$_2$ absorption equilirium in blended amine solutions with activity coefficient models

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The removal of carbon dioxide from exhausted flue gas using amine based solvents continues to be of big interest. In this study, CO2 solubilities of MEA (primary), DIPA (secondary), MDEA (tertiary), AMP (steric hindrance) and their binary mixtures (blended amines) were evaluated by using experiments and thermodynamic models. The solubilities of CO2 have been measured from 40 to 120℃ by the static method. In order to overcome non−ideality, activity coefficients and fugacity coefficients were introduced. The activity coefficient models, such as Deshukh Mather and Electrolyte NRTL models, take into account interaction between solute species in the liquid phase. Also, Kent Eisenberg model without considering non−ideality (activity) was compared with both of two models. All the solubility calculations and optimizations (parameter estimations using SQP and GA) were executed by using MATLAB® 2018a version.