Experimental Study and Modeling of CO2 Solubility in Aqueous Solution of DIPA and MDEA Blended Amine Using Electrolyte-UNIQUAC model

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The technology of carbon capture and utilization (CCU) is a critical issue in various industries. Some kinds of amines have been used for CO2 absorbent: MEA, DIPA, MDEA, and AMP. In this study, equilibrium solubility of CO2 in DIPA and MDEA mixtures were evaluated by using experimental data and thermodynamic models. The solubility of CO2 was measured at 50, 110℃ and at various amine mass fractions. To consider the non-ideality, activity coefficient model, electrolyte-UNIQUAC model, is used to predicted interactions between chemical species in liquid phase. Calculations of CO2 solubility and optimizations (parameter regression) were conducted by in-house model in MATLAB® 2020a version. Effect of temperature and blending ratio of DIPA, MDEA, and H2O about CO2 solubility were estimated. Also, mole fraction of chemical species, pH, heat of absorption, cyclic capacity were predicted successfully.