Amine Blending Optimization for Maximizing CO_2 Cyclic Capacity in a DIPA-MDEA-H_2O System: An Experimental and Modeling Study Using Electrolyte-UNIQUAC model

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Experimental data on carbon dioxide (CO_2) solubility in DIPA (diisopropanolamine) and MDEA (methyldiethanolamine) blended aqueous solutions were newly measured at different amine blending ratios and working temperatures. The successive substitution method was implemented to calculate the mole fractions of all chemical species in liquid phase from equilibrium along with material balances and electroneutrality. The electrolyte universal quasi-chemical (electrolyte UNIQUAC) model was used to consider the non-ideality in the liquid phase. The partial pressures of CO_2 in the gas phase and mole fractions of all components in the liquid phase were predicted. In addition, the effect of the blending ratio of DIPA, MDEA, and H_2O was investigated and expressed using the triangular diagrams of pH, heat of absorption, and cyclic capacity of CO_2 according to the absorption and desorption conditions.