Binary parameter selectivity and CCS process optimization for primary, secondary, and tertiary alkanolamines

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This paper reports the newly measured experimental data for CO_2 solubility in a blended aqueous solution of monoethanol amine (MEA)/ 2-amino-2-methyl-1-propanol (AMP),di-isopropanol amine (DIPA)/ AMP and Methyl diethanolamine (MDEA)/ AMP at different amine mixing ratios (9:21:70, 15:15:70, and 21:9:70 wt %) and working temperatures (323.15 and 383.15 K). Sensitivity analysis of binary parametes between molecules and ions was performed using Monte Carlo simulation. The successive substitution method were used for calculating the mole fractions of all molecules and electrolytes (cations and anions) from the equilibrium, along with the material and charge balance equations. The Novel shortcut method suggested by Lee et al. [2] was used to investigate regeneration energy of stripper for process optimization. Using the above mentioned thermodynamic models, the partial pressures of CO_2 in the gas phase, mole fractions of all components in the liquid phase, heats of absorption, and absorption capacities of CO_2 according to the absorption/desorption temperature and the blending ratio of (MEA.DIPA.MDEA)/AMP/H_2O were estimated.