Modeling of CO_2 and H_2S Absorption in Mixed Aqueous Solutions of Sulfolane and MDEA

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The removal of acid gases from synthesis gas, natural gas and refinery using mixed solvents continues to be of interest. A mixed solvent may be defined as one consisting of a chemical solvent and a physical solvent. In this study, Sulfolane was chosen as the physical solvent because of its stability and outstanding affinity. MDEA was chosen because it is a representative tertiary amine and is thermodynamically and kinetically selective for H2S in the presence of CO2.

The solubility of CO2, H2S, and their mixtures has been measured from 40 to 130℃ in a various mixing combination of Sulfolane and MDEA solvents by the static method. In order to overcome non-ideality, activity coefficients and fugicity coefficients were introduced. The activity coefficient take into account interaction between solute species in the liquid phase. Debye-Huckel expression given by Deshmukh and Mather (1980) has been used to obtain activity coefficient matrices. The fugacity coefficients were also calculated to consider non-ideality of pressure. All the solubility calculations and optimizations (parameter estimations) were executed by using MATLAB 2007b version.