Investigating the behavior of amine speciation on the heat of CO_2 absorption in the blend of aminoehtylethanolamine and diisopropanolamine

Shaukat Ali, Jin-Young Cha, Sang-Jun Han, Jong-Ho Moon
Department of Chemical Engineering, Chungbuk National University, Cheongju, Chungbuk 28644, South Korea; Tel +82-10-5865-8870, e-mail: shaukatmazari@gmail.com

Energy penalty is a major hurdle for amine-based CO_2 absorption technology for its commercialization. Amine regeneration energy includes sensible heat, latent heat, and heat of reaction. Among others, heat of reaction, which is released during the chemical absorption of CO_2 is a major contributor to the overall regeneration energy of aqueous amines for CO_2 capture.

This makes it pertinent to understand the fundamental behavior reactions, reactants and products involved. In this study a thermodynamic framework has been developed successfully developed by using electrolyte nonrandom two liquid (eNRTL) model to understand the vapor liquid equilibria of aminoehtylethanolamine (AEEA) diisopropanolamine (DIPA) for CO_2 solubility. VLE results of the model are compared with experimental data from the literature.

Focusing on the heat of CO_2 absorption, model is extended to evaluate the role of reactions, reactants and products involved in the heat of CO_2 absorption. Heat of reaction is simulated for each AEEA and DEA separately as well in their blended form. Effect of CO_2 loading, amine blending ratio and temperature are investigated on the heat of CO_2 absorption.