Density and viscosity correlations and thermodynamic properties in post-combustion CO_2 capture processes

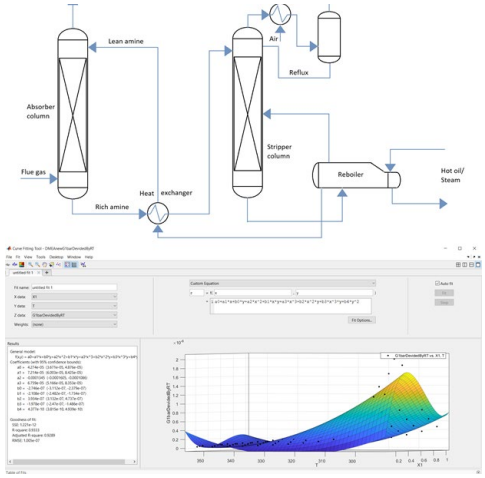
Master's thesis number: FMH606 Master's Thesis, 2022 - MT-93-22

Introduction and background:

CO_2 is captured at atmospheric pressure in exhaust systems during CO_2 capture process. This procedure is more difficult to accomplish in exhaust systems than in natural gas separation due to low CO_2 partial pressure and low concentration in raw flue gas. Separation and collection of CO_2 from gas streams is now possible using a variety of methods. They are based on absorption, adsorption, membranes, and cryogenics, among other physical and chemical processes. Amine-based methods are notable among CO_2 collection technologies. Because of their reversible interactions with CO_2, amines are useful for separating CO_2 from a variety of CO_2-containing gases, including flue gas. In recent decades, post-combustion CO_2 capture (PCC) employing absorption and desorption has gotten a lot of interest, and numerous amines have been studied for their absorption effectiveness. Monoethanolamide (MEA, IUPAC name:2-aminoethanol) has been utilized in acid gas treatment since 1930. It serves as a standard amine for comparing the performance of different amines in terms of CO_2 capture efficiency, reaction rates, energy demand, and corrosion resistance.

Problem description and objective:

In this work, first Eyring viscosity model applied to partial free activation energy of different amines solutions for various flow. Then the excess free energy of activation was calculated. In the meantime, different model developed and $\overline{G_1}$ and $\overline{G_2}$ were calculated based on estimated parameter from Redlich and Kister Correlation by curve fitting method. Then the accuracy of the model has been checked and new correlation for $\overline{G_1}$ and $\overline{G_2}$ in different molar fraction and temperature was developed and it is objective to check the accuracy.



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