عنوان مقاله:

Mass Transfer Modeling of CO۲ Absorption into Blended Aqueous MDEA–PZ Solution

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خلاصه مقاله:

In this research, the rate of CO۲ absorption into methyl diethanolamine–piperazine (MDEA–PZ) solution was investigated. To model the mass transfer flux in the reactive absorption processes, the dimensionless parameters of the process were obtained using the Buckingham Pi theorem and considering the effective parameters in mass transfer. The CO۲ mass transfer flux in the reactive absorption process depends on the mass transfer parameters of both the liquid and gas phases. Based on the dimensionless parameters obtained, a correlation is proposed to calculate the mass transfer flux of acidic gases in MDEA–PZ solutions. The mass transfer flux in the reactive absorption process is modeled based on the four laws of chemical equilibrium, phase equilibrium, mass balance, and charge balance. Experimental data from the literature were used to determine the constants of the derived correlation as a function of dimensionless parameters. In the provided correlation, the effects of dimensionless parameters including film parameter, CO۲ loading, ratio of diffusion coefficients in the gas–liquid phase, CO۲ partial to total pressure, and film thickness ratio as well as factors such as temperature, the number of free amines in the solution, the partial pressure of CO۲, on the CO۲ mass transfer flux were investigated. According to the results, the absorption rate decreases with increasing CO۲ loading and film parameter, and the mean absolute deviation is about ۳.۶%, which indicates the high accuracy of the correlation.

کلمات کلیدی:

CO۲, MDEA–PZ Solution, Buckingham Pi Theorem, Mass Transfer Flux, loading