Solvent Selection for Natural Gas Sweetening Process by Analytical Hierarchy Process: Simulation & Optimization

Asadollah Karimi[1] and Arash Sadeghi[1]

[1]University of Maragheh

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Abstract

In this study, the desirable amine solution for the natural gas sweetening process was selected. The four parameters of yield, availability, cost, and operational conditions were selected as criteria of this process. Also, seven alternatives (amine solution) were proposed for ascertaining the best amine solution. The AHP results indicated that the MDEA as an alternative and the cost as criteria have the highest preference with 21% and 53%, respectively, in comparison to other criteria and alternatives. According to the objectives functions (The reduction of acid gas contents and reboiler duty), the simulation results reveal the best of feed gas temperature, and MDEA concentration is 30 ºC and 39 wt.%, respectively. In this condition, the MDEA solution consumption and reboiler duty reduced by 5% and approximately 0.04% as compared to the initial conditions, respectively. The amount of hydrogen sulfide and carbon dioxide achieved 2.4 and 88 ppm in the optimal condition.

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