Carbon Dioxide Removal Using N-Methyldiethanolamine Promoted by Piperazine in Emulsion Liquid Membrane

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Abstract
Carbon dioxide absorption by chemical solvents such as aqueous solutions of alkanolamines is one of the widely used separation processes. However, these aqueous solutions of alkanolamines in carbon dioxide absorption will cause corrosion because it is directly in contact with the metal surfaces. This study introduced carbon dioxide absorption using emulsion liquid membrane consists of extractant (N-Methyldiethanolamine) and activator (piperazine). Piperazine (PZ) known as activator to increase absorption rate since N-Methyldiethanolamine (MDEA) has a slow reaction with amines. The emulsions were prepared by varying the amount of MDEA/Piperazine. This paper presents the characteristic and the performance of emulsion liquid membrane for carbon dioxide absorption. The characteristic of emulsion was based on the stability before and after CO\textsubscript{2} absorption while the performance of emulsion was based on the amount CO\textsubscript{2} absorbed. The stability and the amount of CO\textsubscript{2} absorption were studied to determine the optimum formulation of emulsion. The CO\textsubscript{2} absorption experiment was performed by using rotating disc contactor (RDC) meanwhile gas chromatography (GC) was used to determine the percentage of CO\textsubscript{2} removal. From this research, the optimum formulation was the emulsion containing 8\% MDEA and 6\% PZ. This emulsion gives the highest percentage of CO\textsubscript{2} absorption (54.8\%) with high stability before (89.3\%) and after CO\textsubscript{2} absorption (81.9\%). PZ increase the reaction rate between extractant and CO\textsubscript{2} when it was blended with MDEA thus produce a better formulation of solution that increased the percentage of CO\textsubscript{2} removal.

References


