Absorption of carbon dioxide with triethanolamine in non-aqueous solutions

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Non-aqueous systems comprising methanol solution of alkanolamine have been commercially employed for absorption of CO_2, H_2S, COS, etc., because of their high solubility and capacity, low corrosiveness, and low energy consumption during generation of used liquor. In most studies, the kinetics in the aqueous solution was analyzed using simple mass balances resulted from the zwitterion mechanism of the reaction of CO_2 with alkanolamine proposed by Danckwerts. Although many investigators studied the kinetics of CO_2 with alkanolamine, some discrepancies remained according to the kind of amines, gas/liquid contactor, and analysis method about the rate data, i.e., the order of the overall reactions and the rate constants. In this study we present the method how to obtain the apparent reaction rate constant in the reaction between carbon dioxide and triethanoamine(TEA) in non-aqueous solutions using the measured absorption rate of carbon dioxide. In non-aqueous solutions of TEA, dissolved carbon dioxide is expected to react with solvated TEA to produce an ion pair.