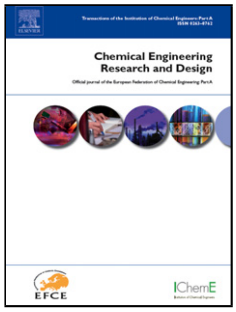

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Experimental study and modeling of CO_2 absorption into diethanolamine solutions using stirrer bubble column

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Highlights

- Solubility and chemical absorption rate of carbon dioxide was study experimentally.
- The effects of stirrer speed on absorption rate and solubility were investigated.
- CO2 absorption was increased with increasing in the stirring speed.
- CO2 capture Enhanced using aqueous DEA in a stirrer bubble column.
- Overall mass transfer coefficients as high as 0.0047 mol/m2.s.kpa is achieved

Abstract

In this work, solubility and chemical absorption rate of carbon dioxide into aqueous solutions of diethanolamine (DEA) were studied in a stirred bubble column. In the experiments the effects of stirrer speed, amine concentration, CO_2 partial pressure and CO_2 loading on absorption rate and solubility were investigated. The experimental conditions are, amine concentration in range of 0.2 - 2.0 M, CO_2 partial pressures in range of 2.4 - 3.6 kPa, stirrer speed in range of 0 - 600 rpm, CO_2 loading in range of 0.1 to 0.7 mole of CO_2 per mole of amine. The results showed that mass transfer flux and absorption percent of CO_2 were varied in range of 34-59% and 0.35-4.32 Kmol $m^{-2}s^{-1}$, respectively. A thermodynamic model, based on Deshmukh and Mather model is proposed for the equilibrium solubility of CO_2 in DEA solutions. It has been found that this model is able to estimate results which are close to the experimental data in terms of the total CO_2 loadings of the solution. Predicted partial