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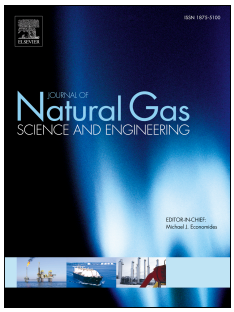

Experimental and correlation study of corrosion rate, absorption rate and CO_2 loading capacity in five blend solutions as new absorbents for CO_2 capture

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Experimental and correlation study of corrosion rate, absorption rate and CO_2 loading capacity in five blend solutions as new absorbents for CO_2 capture

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Abstract

In this study, trisodium phosphate (TSP) was selected as a base absorbent and five additives, including triethylenetetramine (TETA), 2-methylpiperazine (2-MPZ), 2-Amino-2-methyl-1-propanol (AMP), potassium glycinate (K-Gly) and potassium prolinate (K-Pro) were added to improve the absorption performance in terms of corrosion rate, absorption rate and CO_2 loading capacity. The absorption experiments of various blend solutions have been carried out using a vapor-liquid equilibrium apparatus at additive mole fraction range from 0.2 to 0.4, CO_2 partial pressures up to 50 kPa and at temperatures 303.15, 313.15 and 323.15 K. The results indicated that all the evaluated TSP + additives solutions have higher CO_2 solubility and lower corrosion rate compared to MEA. However, the only TETA + TSP showed a better absorption rate than MEA. Moreover, the absorption rate for TSP mixtures containing amine additives were all faster than the single TSP. Finally, ANOVA analysis was employed for all the blend solutions and a correlation for predicting CO_2 solubility was successfully developed.

Keywords: CO_2 solubility; Absorption rate; CO_2 capture; Additive; Corrosion rate.

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