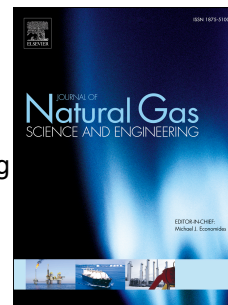


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Experimental and correlation study of corrosion rate, absorption rate and CO₂ loading capacity in five blend solutions as new absorbents for CO₂ capture

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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 proline (K-Pro) were added to improve the absorption performance in terms of corrosion rate, absorption rate and CO₂ 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, CO₂ 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 CO₂ 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 CO₂ solubility was successfully developed.

Keywords: CO₂ solubility; Absorption rate; CO₂ capture; Additive; Corrosion rate.

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