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PERFORMANCE EVALUATION OF AMINO ACID SALT-BASED COMPLEX ABSORBENTS FOR CO_2 CAPTURE

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Abstract

Piperazine (PZ) and phosphates as additives were added into an aqueous glycinate to form complex absorbents, respectively. Performances of the complex absorbents for CO_2 capture were evaluated in a bubble column reactor. Reaction mechanisms and activations of the additives were presented theoretically. The effects of additive types, concentration of additives and gas flowrates on volumetric mass transfer coefficient have been investigated. Effects of orifice size of the gas sparger and stirring rates on average absorption velocity were also discussed. Results show that CO_2 loadings of glycinate-PZ and glycinate-K_3PO_4 complex absorbents were larger than that of single glycinate. The glycinate-PZ complex absorbent gave a highest CO_2 loading in all complex absorbents. The overall mass transfer coefficient increased, subsequently reached a maximum and then decreased with the increase of K_3PO_4 concentration in the complex absorbent. The overall mass transfer coefficient increased with the increase of the gas flow rates. Average absorption velocities increased with the decrease of the orifice size and with the increase of the orifice numbers. The average absorption velocities in moderate intensity of stirring rates were higher than that in the high intensity of stirring rates.

Key words: bubble column, complex absorbent, CO_2 capture, glycine salt, phosphates, piperazine

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