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TRANSPORT PHENOMENA & FLUID MECHANICS

活性炭粒子对K_2CO_3溶液中CO_2化学吸收的强化

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摘要 The enhancement of chemical absorption of CO2 by K2CO3/H2O absorbents in the presence of activated carbon (AC) particles was investigated. The results show that the gas absorption rates can be enhanced significantly in the presence of AC particles, and the maximum enhancement factor 3.7 was observed at low stirring intensities. The enhancement factor increased rapidly with the solid loading during the initial period of absorption and then became mild gradually to a maximum value. Both the liquid-solid contact area and the probability of solid particles residing at the gas-liquid interface decreased with the increase of the particle size, leading to a negative effect on the enhancement of mass transfer. The influence of the particles on gas absorption decreased with the reaction rate. The stirring speed changed the interfacial coverage and mass transfer rate on the liquid side and consequently affected the mass transfer between the gas and liquid phases; the enhancement factor decreased with the stirring intensity. A heterogeneous two-zone model was proposed for predicting the enhancement factor and the calculated results agreed well with the experimental data.

关键词 chemical absorption enhancement factor mass transfer activated carbon particle

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The enhancement of CO_2 chemical absorption by K_2CO_3 aqueous solution in the presence of activated carbon particles

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Abstract

The enhancement of chemical absorption of CO2 by K2CO3/H2O absorbents in the presence of activated carbon (AC) particles was investigated. The results show that the gas absorption rates can be enhanced significantly in the presence of AC particles, and the maximum enhancement factor 3.7 was observed at low stirring intensities. The enhancement factor increased rapidly with the solid loading during the initial period of absorption and then became mild gradually to a maximum value. Both the liquid-solid contact area and the probability of solid particles residing at the gas-liquid interface decreased with the increase of the particle size, leading to a negative effect on the enhancement of mass transfer. The influence of the particles on gas absorption decreased with the reaction rate. The stirring speed changed the interfacial coverage and mass transfer rate on the liquid side and consequently affected the mass transfer between the gas and liquid phases; the enhancement factor decreased with the stirring intensity. A heterogeneous two-zone model was proposed for predicting the enhancement factor and the calculated results agreed well with the experimental data.

Key words chemical absorption; enhancement factor; mass transfer; activated carbon particle

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