

TRANSPORT PHENOMENA & FLUID MECHANICS

多项体系气体吸收的三维非均相传质模型

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**摘要** A three-dimensional heterogeneous mass transfer model was proposed to investigate the enhancement of dispersed particles on gas absorption. The strategy to calculate local and overall enhancement factors is proposed. Instead of a global grid, the composite overlapping grid is adopted, which simplifies the setup and solution of the three-dimensional model equations. It is found that dispersed particle hold-up, particle size, liquid-solid partition coefficient of transported component, characteristic contact time, and the shortest distance between particles and gas-liquid interface have major influence on absorption enhancement factor. The particle-particle interaction on gas absorption and the lateral diffusion of transported component in liquid film were studied with the multi-particle simulation. The proposed model predicted the experimental data from the literature reasonably well.

**关键词** [多项体系气体吸收](#) [三维非均传质模型](#) [复合重叠格](#) [增加因子](#) [气液界面](#)

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**A Three-dimensional Heterogeneous Mass Transfer Model for the Absorption of Gas into Multiphase System**

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**Abstract** A three-dimensional heterogeneous mass transfer model was proposed to investigate the enhancement of dispersed particles on gas absorption. The strategy to calculate local and overall enhancement factors is proposed. Instead of a global grid, the composite overlapping grid is adopted, which simplifies the setup and solution of the three-dimensional model equations. It is found that dispersed particle hold-up, particle size, liquid-solid partition coefficient of transported component, characteristic contact time, and the shortest distance between particles and gas-liquid interface have major influence on absorption enhancement factor. The particle-particle interaction on gas absorption and the lateral diffusion of transported component in liquid film were studied with the multi-particle simulation. The proposed model predicted the experimental data from the literature reasonably well.

**Key words** [gas absorption](#); [composite overlapping grid](#); [enhancement factor](#); [dispersed particles](#); [heterogeneous](#); [three-dimensional model](#)

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