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REACTION KINETICS, CATALYSIS AND……

蒸发鼓泡塔反应器的轴向分散模型

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摘要 Evaporating bubble column reactor (EBCR) is a kind of aerated reactor in which the reaction
heat is removed by the evaporation of volatile reaction mixture. In this paper, a mathematical model that accounts for the gas-liquid exothermic reaction and axial dispersions of both gas and liquid phase is employed to study the performance of EBCR for the process of p-xylene(PX) oxidation. The computational results show that there are remarkable concentration and temperature gradients in EBCR for high ratio of height to diameter (H/DT). The temperature is lower at the bottom of column and higher at the top, due to rapid evaporation induced by the feed gas near the bottom. The concentration profiles in the gas phase are more nonuniform than those (except PX) in the liquid phase, which causes more solvent burning consumption at high H/DT ratio. For p-xylene oxidation, theo ptimal H/DT is around 5.

关键词 轴散射模式 蒸发 气体 液体 氧化反应 煤液化工艺

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An Axial Dispersion Model for Evaporating Bubble Column Reactor

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Abstract Evaporating bubble column reactor (EBCR) is a kind of aerated reactor in which the reaction heat is removed by the evaporation of volatile reaction mixture. In this paper, a mathematical model that accounts for the gas-liquid exothermic reaction and axial dispersions of both gas and liquid phase is employed to study the performance of EBCR for the process of p-xylene(PX) oxidation. The computational results show that there are remarkable concentration and temperature gradients in EBCR for high ratio of height to diameter (H/DT). The temperature is lower at the bottom of column and higher at the top, due to rapid evaporation induced by the feed gas near the bottom. The concentration profiles in the gas phase are more nonuniform than those (except PX) in the liquid phase, which causes more solvent burning consumption at high H/DT ratio. For p-xylene oxidation, theo ptimal H/DT is around 5.

Key words evaporating bubble column reactor; axial dispersion reactor model; gas-liquid reaction; *p*-xylene; oxidation

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