

TRANSPORT PHENOMENA & FLUID MECHANICS

聚合物系动态超临界流体脱挥

叶树明^a, 蒋凯^a, 蒋春跃^b, 潘勤敏^c

^a College of Biomedical Engineering and Instrument Science, Zhejiang University, Hangzhou 310027, China

^b College of Chemical Engineering and Materials Science, Zhejiang University of Technology, Hangzhou 310014, China

^c Department of Chemical Engineering, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1

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摘要 A number of studies have been reported on the applications of supercritical fluids to polymeric processes. The presence of volatiles can affect the end-use properties of polymer materials. Therefore, these volatiles must be reduced to a level below the maximum permissible limit. Conventional heat-rele vant techniques for polymer devolatilization sometimes have limited effectiveness. Devolatilization with supercritical fluids, however, can enhance removal of volatiles from polymers. A model for diffusion-limited extraction is used to characterize dynamic supercritical fluid devolatilization of spherical polymer particles. The rate of supercritical fluid devolatilization for styrene/polystyrene system is measured at 343 K and 18 MPa and at CO₂ flow rate of 1.93, 3.27 and 5.62 L·min⁻¹, respectively. The model analysis, which is consistent with experimental results, indicates that the supercritical fluid devolatilization is not solubility-limited but diffusion-limited when CO₂ flow rate is above 4.00L·min⁻¹.

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Dynamic Supercritical Fluid Devolatilization of Polymers

YE Shuming^a, JIANG Kai^a, JIANG Chunyue^b, PAN Qinmin^c

^a College of Biomedical Engineering and Instrument Science, Zhejiang University, Hangzhou 310027, China

^b College of Chemical Engineering and Materials Science, Zhejiang University of Technology, Hangzhou 310014, China

^c Department of Chemical Engineering, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1

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Abstract A number of studies have been reported on the applications of supercritical fluids to polymeric processes. The presence of volatiles can affect the end-use properties of polymer materials. Therefore, these volatiles must be reduced to a level below the maximum permissible limit. Conventional heat-rele vant techniques for polymer devolatilization sometimes have limited effectiveness. Devolatilization with supercritical fluids, however, can enhance removal of volatiles from polymers. A model for diffusion-limited extraction is used to characterize dynamic supercritical fluid devolatilization of spherical polymer particles. The rate of supercritical fluid devolatilization for styrene/polystyrene system is measured at 343 K and 18 MPa and at CO₂ flow rate of 1.93, 3.27 and 5.62 L·min⁻¹, respectively. The model analysis, which is consistent with experimental results, indicates that the supercritical fluid devolatilization is not solubility-limited but diffusion-limited when CO₂ flow rate is above 4.00L·min⁻¹.

Key words supercritical fluid devolatilization; supercritical CO₂; diffusion coefficient; styrene; polystyrene

通讯作者:

叶树明 zjjcy@zjut.edu.cn

作者个人主页: 叶树明^a; 蒋凯^a; 蒋春跃^b; 潘勤敏^c

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