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传递现象

惰性粒子振动流化床中膏状物料干燥

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摘要

报道了采用带浸没加热管的惰性粒子振动流化床干燥膏状物料的实验研究结果。考察了加料速率、振动条件、进气温度、进气速度、加热管功率等参数对干燥过程的影响，提出采用体积传热系数来评价干燥器传热性能，并得出了计算体积传热系数的准数关联式。结果表明，在流化床中增设振动和浸没加热管装置，能大大强化传热、传质，干燥器热效率达60%，干燥强度超过300 kg·m^{-3}·h^{-1}，体积传热系数可达25 kW·m^{-3}·K^{-1}，激光粒度分析仪的测定结果表明产品的粒度分布范围较窄，该流化床干燥可以直接得到平均粒径为0.35 μm、比表面积为5.024 m^{2}·g^{-1}的粉状产品。

关键词

膏状物料 惰性粒子 振动流化床 浸没加热管 体积传热系数

分类号

扩展功能

本文信息

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Drying of paste materials in vibrated fluidized bed with inert particles

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Abstract

The drying of paste materials was experimentally carried out in a vibrated fluidized bed with inert particles and immersed heating tubes.The effects of operating variables, such as feeding rate, vibration condition, gas temperature, gas velocity and power of heating tubes were researched.The heat transfer performance was evaluated with volumetric heat transfer coefficient, and a correlation to calculate volumetric heat transfer coefficient was established.The experimental results showed that heat transfer and mass transfer could be enhanced by vibration and internal heating.The heat efficiency could be up to 60%, with drying capacity over 300 kg·m^{-3}·h^{-1} and volumetric heat transfer coefficient 25 kW·m^{-3}·K^{-1}.The particle size distribution of the product was narrow, which was analyzed by using a laser particle-size analyzer.A powder product with average diameter of 0.35 μm and specific surface area of 5.024 m^{2}·g^{-1} could be obtained directly by the vibrated fluidized bed.

Key words

paste materials inert particles vibrated fluidized bed immersed heating tube volumetric heat transfer coefficient

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