

片状食品微波干燥热质传递模型及其干燥特性

Modeling of heat and mass transfer and drying characteristics of sliced food with microwave drying

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中文摘要:

为了探索片状食品微波干燥规律,以土豆片为试验模型,对片状食品进行了微波干燥试验和数值模拟研究,获得了土豆片温度变化规律和相应的干燥特征曲线;探讨了微波能水平和切片厚度对干燥过程的影响;根据热平衡和扩散方程建立相应的模型并采用有限差分法求解,试验值与模型计算值基本吻合。土豆片微波干燥经历预热、恒温、快速升温3个阶段:在预热阶段物料干燥脱水少;在恒温阶段物料干燥失去大部分水分;在快速升温阶段物料干燥速率减小,其温度快速上升。恒温阶段物料温度随切片厚度和微波能水平增加而增高;干燥速率不受物料切片厚度变化影响,但随微波能水平增加而增大。

英文摘要:

In order to understand the behavior of sliced food during microwave drying, the microwave drying characteristics of sliced food were investigated experimentally and numerically using potatoes as test samples. The temperature variations and drying characteristic curves during the drying process were obtained. The effects of sample thickness and microwave power level on the drying process were discussed. Using heat balance and diffusion theory, the modeling equations for temperature and moisture changes were developed and solved, which gave the results in good agreement with the experimental ones. It indicates that sliced food experienced three periods during microwave drying: a pre-heating period with little removal of moisture, a constant temperature period in which most moisture loses and food temperature depends on microwave power level and sample thickness, and a quick heating period with drying rate dropping off and sample temperature rising rapidly. It is also found that drying rate increases with the microwave power levels, but is not affected by sample thickness.

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