Drying Technology ›
An International Journal
Volume 24, 2006 - Issue 11

Original Articles

A Model for Drying of an Aqueous Lactose Droplet Using the Reaction Engineering Approach

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Pages 1329-1334 | Published online: 06 Feb 2007

Cite this article https://doi.org/10.1080/07373930600951091

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Abstract

Spray drying is the primary method for manufacturing of food powders from liquids. Optimal design and optimization of spray drying operations at the fundamental level require both modeling of the drying characteristics of a single droplet and dryer wide simulations using computational fluid dynamics (CFD). An accurate yet simple model for drying of a single droplet, which does not require solution of partial differential equation, is ideal input for CFD simulations. The reaction engineering approach (REA) is shown to be appropriate in this regard. It has been successfully used for prediction of skim and whole milk droplet drying behavior under various drying conditions. In this study, an aqueous lactose solution was dried in droplet form and the appropriate REA model parameters obtained. The change of diameter of the droplet during drying was measured experimentally and compared with the model results.

Keywords:

Droplet drying kinetics | Glass filament method | Lactose solution | Reaction engineering approach

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