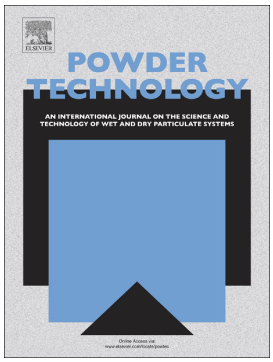

Scale-up of fluidized bed drying: Impact of process and design parameters

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Scale-up of Fluidized Bed Drying: Impact of Process and Design Parameters

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Abstract

The fluidized bed drying unit operation is extensively used in the pharmaceutical industry. However, there are still many unanswered questions with respect to scaling up fluidized bed drying operations. In this study, a scaling method for the fluidized bed drying process was investigated to predict drying under new operating conditions based on existing experimental data. A normalization scaling factor was implemented based on the ratio of operating conditions – heating air temperature, air flow rate and the loading. The scaling method was examined experimentally using a small-scale MiniGlatt and a medium-scale Glatt GPCG-1 fluidized bed dryer. The predictions showed good agreement for variations in air temperature and flowrate, but predictions for variations in loading did not show as good agreement with the experimental data. We investigated the reason for the poor predictions and found that the air distributor area should be chosen as the bed area in the scaling model. Modifying the cross-sectional area available for drying by taking into account the physics of drying in the fluidized bed improves the agreement of the predictions with the experimental data for different loadings. Lastly, we examined scale-up predictions for the GPCG-1 drying performance based on the MiniGlatt experimental data.