

Drying of single liquid droplets intensified by gas absorption

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Abstract

In this work, a series of drying experiments with single slurry droplets is carried out at room temperature and atmospheric pressure. Droplets are millimeter in size and made from aqueous slurries of silica particles. Ammonia-air mixtures with different concentrations are used as drying agent in single-droplet drying setups. The results show a strong influence of the ammonia absorption and desorption on the drying characteristics of the droplets. Also, the temperature profiles of the droplets are impacted by the exothermic effect of ammonia absorption that occurs at the beginning of the drying process. A comparison of our findings with available model predictions reveals a good agreement and thus, paves the way for spray drying of products that are too sensitive to thermal stresses.

Keywords: *Active gas absorption/desorption, single droplet, drying kinetics, temperature profile*