

Modeling the Behavior of Single Particle during Drying Process

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Introduction:

The aim of the present work is the formulation of a computational model describing the transport phenomena in transient biosolids drying. This work is specifically focused on simulation of the transport of momentum, heat and mass occurring between warm dry air and a single particle of moist sludge. The simulation in the gas phase was connected to the simulation in the solid phase by way of temperature continuity, and moisture equilibrium by empirical equilibrium moisture content (EMC) correlation. Heat and mass transport are simulated in the solid phase, assumed to have physical properties similar to pure water. Comsol Multiphysics was used to perform the simulations, with two spatial dimensions. With a time step of 0.1 second, we find that the solid reaches thermal equilibrium with the surrounding gas rapidly, consistent with empirical correlations.

Key Words: Biosolids, drying, transport phenomena, wastewater sludge

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