Lessons from Mixing in Fluidized Beds and Related Systems

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Abstract

Fluidized beds can be used to blend or classify solid particles, depending on their properties and the operating conditions. Mixing is important with respect to fluidized bed reactor design, as well as in maintaining effective fluidization. This paper will give an overview of the mechanisms that govern mixing and the processes that promote and suppress mixing in liquid-fluidized beds and low- and high-velocity gas-fluidized beds, as well as spouted beds. Inter-particle forces, convective flows associated with non-uniformities and phase separation associated with instabilities will all be shown to play significant roles in determining flow patterns, and hence the degree of mixing. Axial dispersion models are often used inappropriately to describe mixing processes, resulting in large discrepancies and inability to predict the degree of mixing. Agglomeration is a common problem, often controllable by appropriate design.