

TECHBRIEF

SPOUTED BED REACTOR FOR THE FLUIDIZATION OF FINE PARTICLES

OPPORTUNITY:

Research is active on the design of a spouted bed with a spoutable media to more easily fluidize the fine particles involved in industrial processes by improving mixing and increasing contact area between the fluidizing gas and the particles. This technology is available for licensing and/or further collaborative research from the U.S. Department of Energy's National Energy Technology Laboratory.

OVERVIEW:

Many industrial processes involve the conversion or reduction of solid materials via non-homogeneous reactions between the solid material and a surrounding gaseous or liquid medium. Among solid-gas reactions, fluidized beds are generally considered to be the most popular reactors because the individual particles are suspended within the gaseous phase, which provides excellent surface contact for the desired reactions to take place. However, not all types of solid particles can be easily fluidized.

The most common technology currently in use for reactions involving fine particles uses either rotating drums or mechanical agitators to mix the process reactants. Vibrated fluidized beds are also common. These technologies involve the use of moving parts operating at high temperatures, where the likelihood of mechanical failure is increased, requiring potentially expensive maintenance and operating costs.

The invention is based upon the idea of utilizing a spouted bed with a spoutable media to more easily fluidize the fine particles to improve mixing and contact area between the fluidizing gas and fine particles. In a spouted bed, the fluidizing gas is injected into a dense bed of particulate material located at the bottom of the bed, which is typically conical in shape.

SIGNIFICANCE:

- Allows for enhanced mixing and contact area between solid and gas-phase reactants, thus improving reaction yields
- Eliminates moving parts operating at high temperatures, resulting in fewer mechanical failure points and maintenance costs

(continued)

APPLICATIONS:

The facilitation of fluidization and mixing of fine and/or cohesive particles for facilitating chemical reactions, such as processing of fine hematite (Fe_2O_3) into magnetite (Fe_3O_4) via reduction with CH_4 .

RELATED PATENTS:

- U.S. Non-provisional Patent Application No. 16/163,823 titled, "*Method for Processing Fine Particles with a Spouted Bed Reactor*"
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