

International Conference and Expo on

Separation Techniques

August 10-12, 2015 San Francisco, USA

Discharge times of 3.0 micron superfine powders from a circulating fluidized bed of a binary mixture

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The high gas velocities in Circulating Fluidized Beds (CFBs) often result in fine powders becoming discharged and lost in the fluid going out at the cyclone upside stream. Thus, residence times of these fines in the bed will drastically fall together with the overall performance of the whole fluidizing system. The discharge time, TD, represents the time needed for all the fines to be discharged out of the bed. Therefore, the loading of superfine in the bed decreases. The discharge times of micron-size superfines from a semi-batch CFB were investigated using a binary mixture of superfine aluminium hydroxide powders (3.0 μm mean size) and coarse FCC particles (66 μm mean size). The discharge times of superfines are believed to be affected not only by gas humidity, but also by the water content of the bed particles. The effects of the equilibrium water content of FCC particles on the discharge times of superfines were investigated under different gas velocities and starting loadings of superfines of 3 and 5 wt.%. At a certain gas velocity, the discharge times decreased sharply using FCC particles of higher moisture contents as 0.054–0.067 wt.H₂O /wt. dry FCC, irrespective of the loading of superfines. Dry FCC particles and FCC particles of lower moisture contents as 0.038 wt.H₂O/wt.dry FCC, were found not to be appropriate for CFB as extremely large discharge times of superfines were obtained at higher loadings of superfines. High gas relative humidity at 85% could not decrease the discharge times of superfines in the presence of totally dry bed particles.

Biography

Mohammed W Hakami has completed his PhD in Chemical Engineering from Swansea University, UK on October 2013 in the field of water treatment using membrane. His work is in a membrane technology. He is interested in separation techniques and teaches separation process courses at the Yanbu Industrial College.

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