Suspension of Slurries with Solids of Mixed Densities

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Abstract

The well known Zwietering correlation works well to predict the just suspended speed for solids in mechanically agitated vessels for a slurry of one particle density. In many industries such as mining and nuclear waste processing there are often mixed densities with a small amount of quite dense but fine material. In these mixed density systems, if the assumption is made that all the particles are at the higher density then this will result in an unnecessarily conservative estimate of power consumption.

The required speed for suspending a slurry consisting of a majority of low density solids with a small amount of high density solids is studied in this work. Only one tank size and impeller design were utilized since the objective is to develop a "mixing" rule for slurries of bimodal densities. A simple rule based on total power seems to fit the experimental data of this work and much of the data of Kresta et al.. There are certain conditions of high concentrations of the lower density solids where an average slurry density improves the fit. Additional work needs to be done using other geometries but this paper offers a logical procedure worth trying.