

Mixing & Resuspension of High Powder Loads Using a Magnetic Mixer

Mixing system: Newmix®- Levtech® Magnetic Mixer

Mixing bag: 200L M-Mix bag

Mixing type: Powder-liquid

The Newmix-Levtech Magnetic Mixer is a compact and non-invasive single-use mixing system. The heart of this system is a mixing bag incorporating an innovative bottom-mounted magnetically-driven impeller capable of providing efficient high-torque mixing for all powder-liquid and liquid-liquid mixing applications. The impeller rides on a low-friction, inert bearing assembly designed to ensure low particle shedding while allowing mixing of very high powder loads in large liquid volumes. All product-contacting surfaces are 100% disposable.

Introduction

Powder-liquid mixing is a common requirement in biopharma processing. In order to maximize mixing efficiency for powder-liquid applications, the Magnetic Mixer is available with a large (6.35"), centrally-located magnetic impeller.

In this experiment, a Magnetic Mixer system's ability to suspend a very high powder load, and its resistance to stalling when buried by compacted solid, was tested. The powder chosen was diatomaceous earth, a fine, inert and insoluble, powdered filter medium that is light and fluffy when it is dry, yet forms a dense mud when mixed with water.



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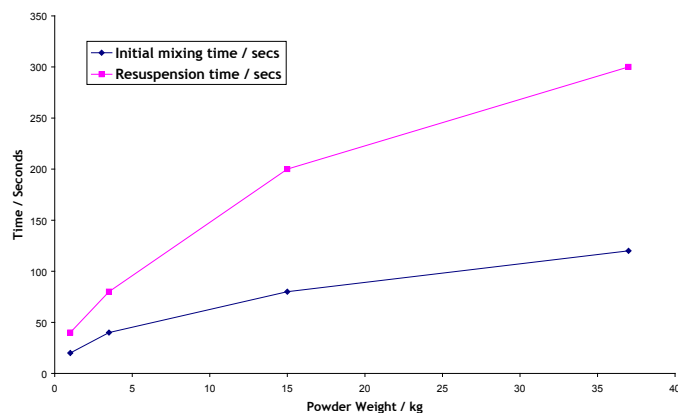
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Experimental

A 200L Magnetic Mixer mixing bag was filled with ~160L of water, and mixing speed was set to 300rpm. Diatomaceous earth powder ($d=0.22\text{kg/L}$) was then added, incrementally, to the top of the mixing bag up to a cumulative added weight of 37kg. After each addition, the time taken to create a uniform suspension was noted, then the mixer was shut off and the suspended powder was allowed to settle into a dense, compacted mud at the bottom of the mixing bag. After the powder had settled, mixing was restarted, and the time to completely re-suspend the powder was recorded.

Mixing and Re-Suspension Times vs. Powder Weight



Results

The accompanying chart shows initial suspension (mixing) time, and the subsequent re-suspension time, as a function of the cumulative amount of diatomaceous earth added. The data demonstrates that even the highest powder load of 37kg was successfully suspended within only a few minutes. Furthermore, after allowing the powder to settle such that it completely buried the magnetic impeller, the mixer was able to fully re-suspend the powder within 5 minutes.

At no time during the experiment did the impeller stall or hesitate. Video of this experiment is available upon request.

Conclusions

The Newmix-Levtech Magnetic Mixer system is well suited to powder-liquid mixing applications, even when very high powder loads are anticipated. The Magnetic Mixer is also capable of functioning properly and effectively without stalling when the impeller is buried under a dense layer of sediment.