

Mixing a Diatomaceous Earth Slurry using the WandMixer™

Mixing system: Newmix®- Levtech® WandMixer™

Mixing bag: 200L W-Mix bag

Mixing type: Powder-liquid

The Newmix-Levtech WandMixer is a compact and non-invasive single-use mixing system. The heart of this system is a mixing bag incorporating an innovative top-mounted impeller capable of providing efficient mixing for all powder-liquid and liquid-liquid mixing applications. The impeller comprises a rotating wand inside an inert polymer sleeve, and is designed to ensure low particle shedding and total containment while serving effectively in a wide variety of mixing tasks. All product-contacting surfaces are 100% disposable.

Introduction

Powder-liquid mixing is a common requirement in biopharma processing. In order to optimize mixing efficiency for powder-liquid applications, the WandMixer is available with a large, diagonally-mounted helical mixing wand.

In this experiment, a WandMixer's ability to suspend a very high powder load 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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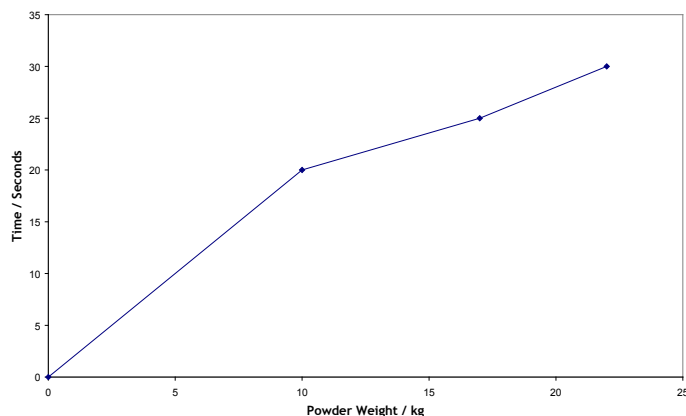
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Application note XA303E 0807rev1

Experimental

A 200L WandMixer mixing bag was filled with ~180L of water, and mixing speed was set to 250rpm. Diatomaceous earth powder ($d=0.22\text{kg/L}$) was then added in increments up to a total weight of 22kg. After each increment, 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 over several hours. After the powder had settled, mixing was restarted, and the impeller's ability to resume mixing was observed.

Re-Suspension Times vs. Powder Weight



Results

When initially added, the dry diatomaceous earth powder was dispersed completely within a few seconds of completing the add; the limiting factor to faster dispersion was the speed of dispensing the dry powder. Once the full 22kg had been added, the WandMixer provided sufficient agitation to maintain all of the powder in suspension.

After the powder had settled, complete re-suspension of the slurry took only 30 seconds even at the highest load. The times taken for full re-suspension are shown in the accompanying chart.

At no time during this experiment did the mixer's wand impeller stall or otherwise hesitate. Video of this experiment is available upon request.

Conclusions

The mixing action of the WandMixer system is capable of high mixing efficiency without stalling in high-load powder-liquid applications. The maximum load tested, 22kg of diatomaceous earth, was easily re-suspended within 30 seconds.