Life Sciences

Application Note

USD 3052

Mixing a Diatomaceous Earth Slurry using the Pall® Wand Mixer

Mixing system: Pall Wand Mixer

Mixing biocontainer: 200 L Mixer biocontainer

Application mixing type: Powder-liquid

The Pall Wand Mixer is a compact and non-invasive single-use mixing system. The heart of this system is a mixing biocontainer incorporating an innovative top-mounted impeller capable of providing efficient mixing for 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.

Introduction

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

In this experiment, a Wand Mixer 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.

Experimental

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

Results

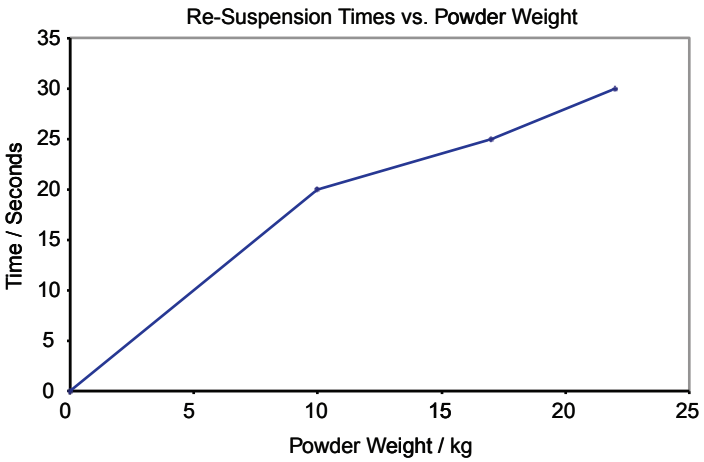
When initially added, the dry diatomaceous earth powder was dispersed completely within a few seconds of completing the add; the limiting factor to faster dispersion was the speed of dispensing the dry powder. Once the full 22 kg had been added, the Pall Wand Mixer provided sufficient agitation to maintain 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 Figure 1.

At no time during this experiment did the mixer's wand impeller stall or otherwise hesitate.

Figure 1

Time Taken for Full Re-Suspension



Conclusions

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

PALL Life Sciences

Corporate Headquarters
Port Washington, NY, USA
+1.800.717.7255 toll free (USA)
+1.516.484.5400 phone
biopharm@pall.com e-mail

European Headquarters
Fribourg, Switzerland
+41 (0)26 350 53 00 phone
LifeSciences.EU@pall.com e-mail

Asia-Pacific Headquarters
Singapore
+65 6389 6500 phone
sgcustomerservice@pall.com e-mail

Filtration. Separation. Solution.SM

Visit us on the Web at www.pall.com/mixing

E-mail us at allegro@pall.com

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