



Application Note

USD 3040

Mixing of High Powder Loads Using a LevMixer® System

Mixing system: LevMixer system

Mixing biocontainer: 200 L LevMixer biocontainer

Application mixing type: Liquid-liquid

The LevMixer system is a compact mixing system. The heart of this system is a mixing biocontainer incorporating a bottom-mounted levitating impeller designed for powder-liquid and liquid-liquid mixing applications. The impeller is frictionless and generates no particles.

Introduction

Powder-liquid mixing is a common requirement in biopharmaceutical processing. In order to maximize mixing efficiency for powder-liquid applications, the LevMixer system is available with a 16.13 cm diameter impeller.

In this experiment, the LevMixer system's ability to resist 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.



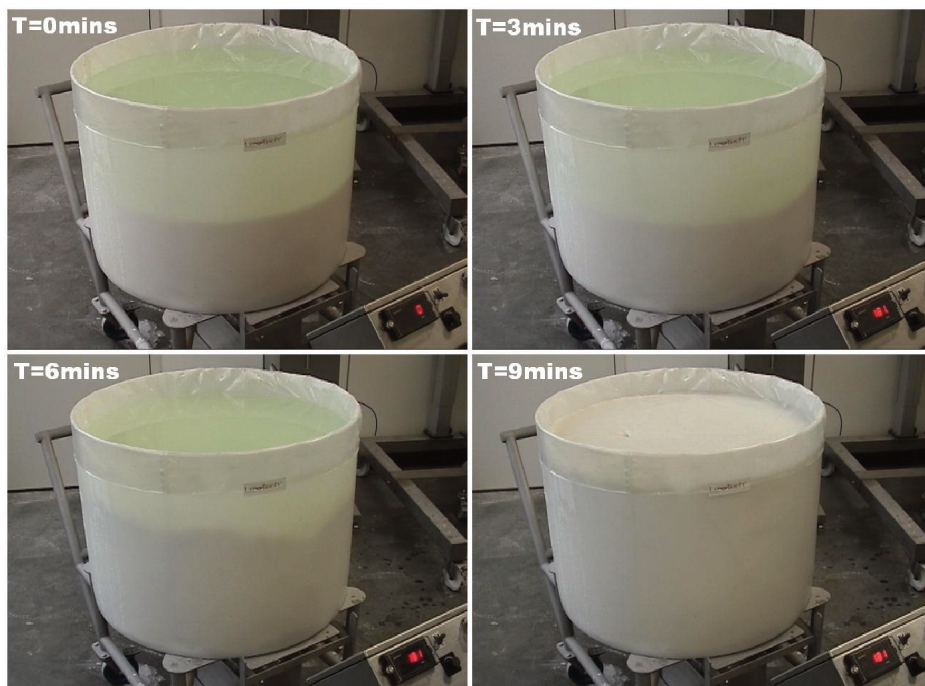
Experimental

A 200 L LevMixer mixing biocontainer was filled with ~160 L of water, and mixing speed was set to 180 rpm. Diatomaceous earth powder ($d=0.22$ kg/L) was then added until a total weight of 37 kg was reached. The LevMixer system provided sufficient agitation to maintain the diatomaceous earth powder in suspension. The mixer was then shut off, and the suspended powder was allowed to settle into a dense, compacted mud at the bottom of the mixing biocontainer. After the powder had settled, mixing was restarted, and the impeller's ability to resume mixing was observed.

Results

The 37 kg powder load was sufficient to completely bury the LevMixer system impeller in a dense sedimentary mud. Despite being less strongly coupled to the drive unit than other Pall mixing impellers (such as those on the Pall Magnetic Mixer or the PadMixer® systems), the levitated impeller was able to smoothly and immediately resume mixing without becoming decoupled or otherwise stalling.

Despite its ability to resist stalling, the upper speed limit of the levitated impeller (180 rpm) meant that the LevMixer system's mixing action was noticeably less vigorous than with some other Pall mixers. Even 2 hours after mixing had resumed, some residual powder (approximately 1% of the total powder load) was found still adhering on the bottom of the mixing biocontainer.



Conclusions

The LevMixer system is well suited to powder-liquid mixing applications, even when very high powder loads are anticipated. However, if re-suspension of dense powder is a requirement, then alternative Pall mixers (such as the Pall Magnetic Mixer or the PadMixer system) are recommended as more efficient choices.



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