

# Newmix® - Levtech® Application note

## Mixing of Aluminum Hydroxide Gel in Water with Pad-Drive™

Mixing system: Newmix®- Levtech® Pad-Drive™ 1000 system

Mixing bag: 500L Q-Mix™ bag (US Pat.No. 7,249,880)

Mixing type: liquid-liquid

The Newmix-Levtech Pad-Drive system is a scalable and non-invasive single-use mixing system. The heart of this mixer is an innovative top-mounted mixing paddle that allows effective and uniform mixing in demanding applications, such as preparation of contained high-solids solutions or mixing of high-viscosity liquids.

## Introduction

Alhydrogel (aluminum hydroxide gel) is a common pharmaceutical adjuvant. However, maintaining it in a homogeneous aqueous suspension can be challenging because alhydrogel tends to settle over time. Once settled, the viscous alhydrogel lower layer can be difficult to remix.

In this experiment, a Pad-Drive 1000 system was fitted with a 500L mix bag/vessel, and used to prepare 500L of a 1.4g/L alhydrogel suspension.

Several mixing parameters were evaluated to determine their impact on mixing efficacy. The objective was to obtain effective mixing with the lowest feasible paddle speed, thus minimizing the risk of foaming or shear-related product damage.

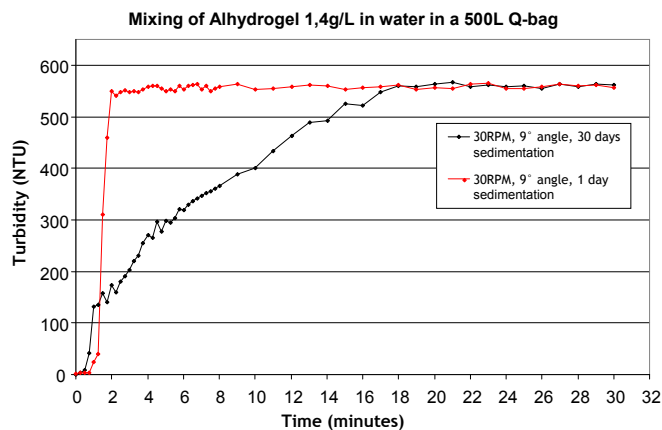


Fig.1: Comparison of Top & Bottom Sampling

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## Experimental

A 500L Q-Mix bag was filled with 432L of DI water and 68L of 10.3mg/ml alhydrogel. Once mixed, this resulted in a suspension containing 700g aluminum in 500L (i.e. 1.4g/L, or 0.14% w/v Al). The content of the bag was allowed to settle for 24 hours to ensure sedimentation. Once settled, the content was agitated using the Pad-Drive 1000 system. During mixing, samples of the mixed liquid were taken at 15 second intervals and tested for homogeneity using a turbidity meter (Fig.1)

A series of mixing tests were performed to evaluate the effect of various paddle speeds and paddle angle settings. After each mixing test, the liquid was allowed to settle for 24 hours before the next test was performed (Fig.2).

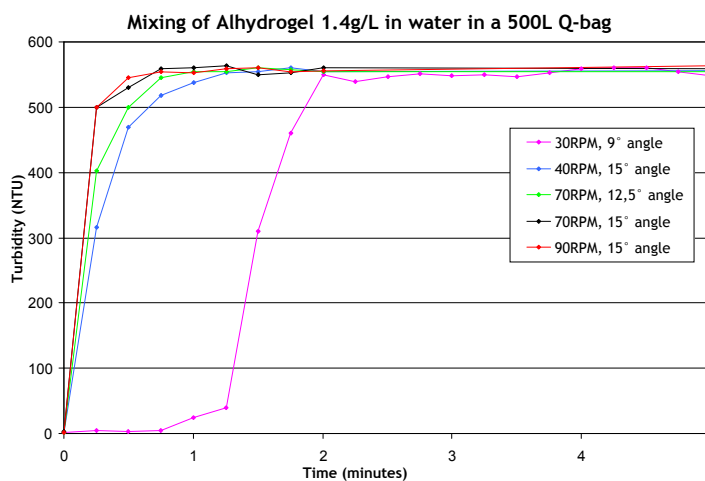


Fig.2: Effect of Mixing Speed & Mixing Angle

## Results

The accompanying charts show typical results for mixing under various conditions.

In most cases, the alhydrogel was evenly dispersed within the first 60 seconds. Even with the gentlest mixing conditions (30rpm paddle speed at 9° paddle angle), mixing was complete within 120 seconds.

## Conclusions

The paddle mixing action of the Newmix-Levtech Pad-Drive 1000 system is capable of high mixing efficiency in viscous liquid-liquid applications, even when operated at its least vigorous, lowest-shear settings