

## High Viscosity Mixing using a Magnetic Mixer

Mixing system: Newmix®- Levtech® Magnetic Mixer

Mixing bag: 200L M-Mix bag

Mixing type: Liquid-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

High-viscosity materials can present a formidable mixing challenge, yet they also serve to illustrate the relative strengths and weakness of different mixing technologies. In this experiment, a Magnetic Mixer was used to perform liquid-liquid mixing in a highly viscous matrix - high fructose corn syrup 90% at a viscosity of 1200 centipoise.



## Experimental

A 200L Magnetic Mixer mixing bag with centrally-mounted large (6.35") impeller was filled with 200L of ADM Cornsweet®90 high fructose corn syrup (HFCS90), and mixing speed was set to 300rpm. A 60ml aliquot of dilute sodium hydroxide solution (8M NaOH) was then added, via a top-mounted inoculation port, to the surface of the HFCS90. Solution homogeneity was monitored via a pH sensor mounted in the top of the bag.

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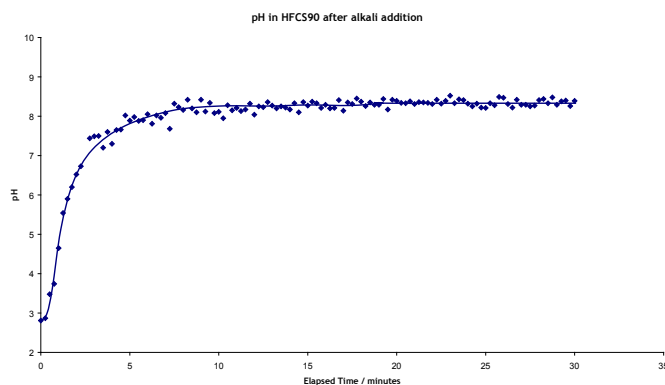
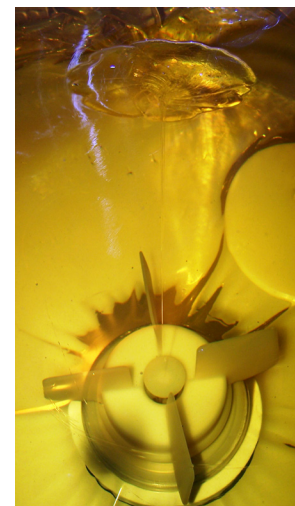
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## Results

The accompanying chart shows solution homogeneity in the bag during mixing. After the NaOH addition, mixing was found to be complete within approximately 20 minutes. At no time during the mixing cycle did the impeller stall or hesitate. Video of this experiment is available upon request.



During mixing, it was observed that the added NaOH solution tended to accumulate on top of the HFCS90, immediately above the mixing impeller, with only a narrow “string” of NaOH being drawn down into the impeller (see accompanying image), whereas normally a deep vortex would be expected. This behavior was attributed to the unusually high density of the HFCS90, which inhibited vortex formation and thus caused the relatively buoyant NaOH to remain stratified on the surface for an extended period of time.

## Conclusions

The Newmix-Levtech Magnetic Mixer system can perform effectively at viscosity up to 1200cP. However, while a 20 minute mixing time is respectable, other ATMI mixing technologies are capable of still faster mixing in such applications, and would be preferred if high-viscosity liquid-liquid mixing is the primary intended purpose.