Life Sciences

Application Note

USD 3022

High Viscosity Mixing using a Pall® Magnetic Mixer

Mixing system: Pall Magnetic Mixer

Mixing biocontainer: 200 L Mixer biocontainer

Application mixing type: Liquid-liquid

The Pall Magnetic Mixer is a compact single-use mixing system. The heart of this system is a mixing biocontainer incorporating an innovative bottom-mounted magnetically-driven impeller capable of providing efficient high-torque mixing for 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 high powder loads in large liquid volumes.

Introduction

High viscosity materials can present a formidable mixing challenge, yet they also serve to illustrate the relative strengths and weaknesses 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.

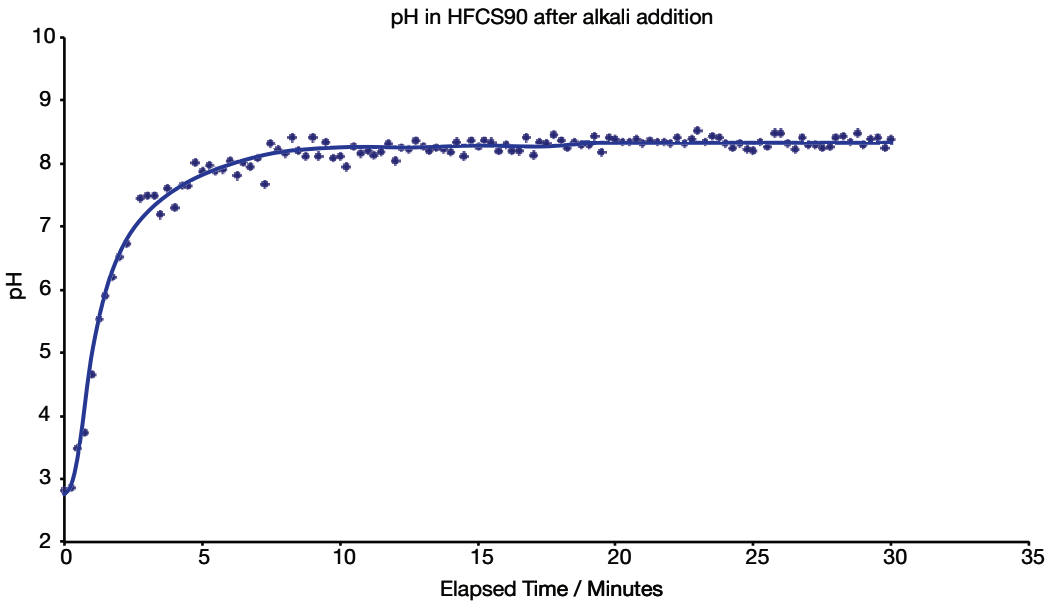
Experimental

A 200 L Magnetic Mixer mixing biocontainer with centrally-mounted 16.13 cm (6.35 inch) impeller was filled with 200 L of ADM Cornsweet◆ 90 high fructose corn syrup (HFCS90), and mixing speed was set to 300 rpm. A 60 mL 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 biocontainer.

Results

Figure 1 shows solution homogeneity in the biocontainer during mixing. After the NaOH addition, mixing was found to be complete within approximately 20 minutes.

Figure 1
pH in HFCS90 after alkali addition



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 Pall Magnetic Mixer can perform effectively at viscosity up to 1200 cP. Visit www.pall.com/mixing to see the full range of Pall mixing solutions.

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