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PharMix® SC System pH Indicator Testing Tech Data Sheet

X-7365-0

The PharMix® SC System* is a Single Campaign (single-use) mixing system. It is suitable for a wide range of industries utilizing a round, single-use 3D Mixing BioContainer with a self-contained mixing paddle with no seals, bearings or breach of the aseptic boundary. It features a patented* unique, multi-plane mixing motion.

Introduction

The need for flexibility has accelerated the adoption of single-use processing solutions in many industries. One of the most common but difficult tasks is sanitary mixing applications. The common issue with implementing single-use mixing systems is achieving desirable, fast, efficient mixing results and one that can be scalable. One method to prove these attributes is pH indicating testing which features a liquid-liquid mixing of similar viscosities and specific gravity, under specific conditions and time frame.

Experiment Procedure

In this experiment a PharMix SC System was used to mix pH indicating solutions, under identical conditions, using the same mixing hardware system. Other than the speed of the agitator, only the disposable Mixing BioContainer and portable holding tank itself were changed for 200L to 1000L capacities.

The protocol was to fill the vessel with the appropriate volume of DI Water, then add an amount of 1% phenolphthalein solution. The mixer was turned on for 2 minutes. While the mixer was running a sodium hydroxide (NaOH) solution was added and timing started. The solution turns from clear to pink (basic). Once mixed a phosphoric acid solution (H₃PO₄) was added to change the solution back to clear (acidic). The entire experiment was video recorded.

Volume	<u>200 L</u>	<u>1000 L</u>
DI Water	200 L	1000 L
Phenolphthalein (approx 1% vol)	95 mL	475 mL
NaOH (approx 27% vol)	740 mL	3700 mL
H₃PO₄ (approx 40% vol)	740 mL	3700 mL
Agitator Speed	52 RPM	45 RPM



* US Patent No.8,152,362



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Results and Discussion

The results were based on visual observation and timing determined by the clock on the video. The changes can be clearly seen in photo stills of the videos. The actual videos of the entire process provide much more clarity. (visit: www.pharmix-sc.com) The 200L size was performed in a clear acrylic tank and a side view could be shown, the 1000L was performed in a standard stainless steel tank with a top view. The change from clear to pink was fairly rapid, the change from pink to clear was slightly slower and gave a better representation of how the fluid was mixing. The mixing patterns viewed were closely related to previous CFD analysis completed. See page 3 for photo results.

Based on the results, both were fully mixed in 30 seconds or less. The exact timing is not as critical as identifying the mixing pattern and completeness of mixing. Based on the results, this would meet or exceed any liquid-liquid mixing requirements of similar viscosity and specific gravity. These results would especially meet those using acid-base reactions where pH change in a certain time frame is critical. Our mixing study shows how quickly pH may be adjusted in the total volume without dead spots or areas of concern.

Summary

Based on the pH indicator testing, one can see that the PharMix SC System is fully capable of achieving efficient and homogenous liquid-liquid mixing in a given timeframe. It also shows the system is scalable. This technical data sheet can be used as a reference for many mixing applications, however all specific applications should be evaluated. Contact our specialists for assistance with any PharMix SC System process solution.

Reference: See TDS X-7367 for PharMix SC System mixing comparison to conventional mixing systems.

Photo results:

Note: The videos of the entire process provide much more detail and clarity visit: www.pharmix-sc.com

200L SC System 52 RPM



0 Sec.



10 Sec.



15 Sec.



20 Sec.



25 Sec. (Fully Mixed)

1000L SC System 45 RPM



0 Sec.



10 Sec.



15 Sec.



20 Sec.



25 Sec.



30Sec . (Fully Mixed)