Technical Bulletin

FOOD AND BEVERAGE

Biofilm treatment

in a CIP system

Biofilms are known to be a major source of food contamination, causing millions of dollars in product recalls each year. These organic contaminants can form on any type of surface, even in conditions that normally prevent bacterial growth. Biofilms can also grow in pipes, especially in the dairy, brewery and juice industries. Since direct contact with the surface is impossible to maintain during pipe cleaning, equipment must be cleaned in place (CIP) with the circulation method. This makes the task of removing biofilms even more difficult.

During CIP by circulation method, the cleaning and/or disinfectant solution is pumped through the pipes for a specific period of time (at least 10 minutes). Because the pressure of the liquid must be adjusted, a foaming solution cannot be used due to the pressure fluctuation it can create in the CIP system. Instead, a liquid peracetic acid-based sanitizer such as Chinook™ is used at 1000 ppm for 20 minutes. However, this causes a strong vinegar smell and can accelerate the corrosion of equipment.

The setup required for a circulation CIP system is also costly. The standard system uses three solution tanks: one for the alkaline cleaner, one for the acid cycle, and one for the "clean" rinse water.

Customers need a biofilm treatment product that can be integrated into their existing CIP system without requiring major modifications. This poses a significant challenge. In response, we created BIOTIZER™, a biofilm treatment product that addresses all of these issues. Like Chinook™, it can be safely injected into the CIP systems without requiring any modifications.

The science behind the BIOTIZER™ formulation

Previous studies and scientific literature have shown that peracetic acid is effective against biofilm formation; it penetrates the exopolysaccharide structure and kills the microorganisms within the biofilm. Through our research, we were able to further improve the effectiveness of peracetic acid by adding adjuvants. Combining BIOTIZER™ with an acid such as ENVIRO-ACID™ increases the product's effectiveness against biofilms. This means that BIOTIZER™ can be added to the acid mixture of the CIP system and achieve the same or better sanitizing effectiveness than peracetic acid alone, but without the strong vinegar smell or corrosive effect.

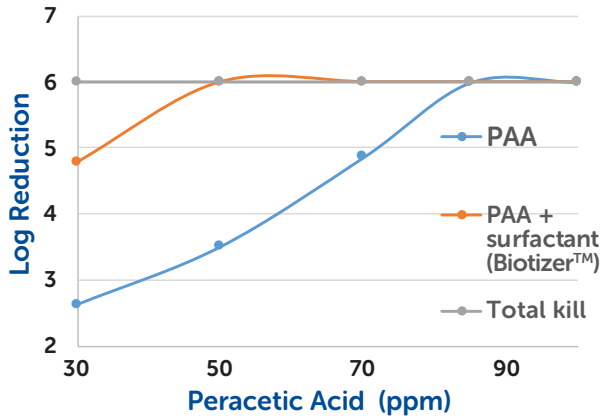
SANI MARC
Hands-on Hygiene

Antibacterial efficacy testing

Laboratory tests were conducted to compare the antibacterial efficacy of peracetic acid alone to that of BIOTIZER™. Superior efficacy was demonstrated due to the synergistic effect of the surfactant and peracetic acid contained in BIOTIZER™.

The effect initially demonstrated on biofilms led us to wonder if it would have a similar effect on planktonic bacteria, the type of bacteria found outside biofilms. We therefore performed a sanitizing efficiency test using the AOAC 960.09 method on the following bacteria: *E. coli, Listeria, Salmonella, Pseudomonas* and *Enterococcus*. The results showed that a 6-log reduction can be achieved using 30% less product. In other words, BIOTIZER™ can be used at 50 ppm instead of peracetic acid at 85 ppm. These results are illustrated in Graph 2 below.

Graph 2: Antibacterial Efficacy of Peracetic Acid-Based Products



Conclusion

These studies show that there is a highly interesting synergy between peracetic acid, ENVIRO-ACID™ and surfactants. This synergistic mixture not only significantly reduces the amount of oxidizing agent (peracetic acid) required during treatments, it also fills the need for a viable solution for treating biofilms and sanitizing pipes in several food industry sectors. This innovative approach offers other benefits as well. Combining the acid and the sanitizer shortens both overall treatment time and water consumption. In addition to preventing and eliminating biofilms, BIOTIZER™ significantly reduces the consumption of peracetic acid. This in turn reduces the risk of corrosion, increases production time and cuts down on the strong vinegar smell.