CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2023
DateRun:	10/20/2023
Experimenters:	Alicia McCarthy, Namrata Chauhan, Serena Burkinshaw, Mei Jin
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Stainless Steel
PartType:	Coupon
Contaminants:	Bacteria - Gram Negative, Bacteria - Gram Positive
Cleaning Methods:	Manual spreading
Analytical Methods:	Organism count
Purpose:	Proof of concept product comparison disinfection testing of gram-negative and gram-positive bacteria on a clean stainless steel surface.

Experimental Procedure:

Escherichia coli (*E.coli*) *ATCC 29214* and *Staphylococcus aureus (S.aureus) ATCC 33591* were cultured in 3 mL of tryptic soy broth (TSB) at 37°C for 16-18 hours to achieve specified optical densities (OD600) for each bacterium (*E. coli*, Abs 0.137; *S.aureus*, Abs 0.132). Four autoclaved glass Petri dishes, each containing a clean, sterilized stainless steel coupon, were labeled as positive (P+), negative (N-), test 1 (T1), and test 2 (T2) for each product tested. Ten microliters of each bacterium were air-dried on P+, T1, and T2 coupons for 15 minutes. D/E neutralizing broth (15 mL) was added to separate conical tubes labeled P+, N-, T1, and T2. Coupons N-, T1, and T2 were treated with 1000µl of product solution for five minutes before being placed in a sterilized conical tube and shaken for 10 minutes. Serial dilutions in 1xPBS of P+, T1, and T2 were prepared up to 10^-4 using the solution in the conical tubes. One hundred microliters of each dilution were plated on tryptic soy agar (TSA) petri dishes, spread using glass beads, and incubated at 37°C overnight. Colony counts the following day were used to calculate log reduction and percent removal.

The *S.aureus ATCC 33591* utilized in this test is a methicillin-resistant (MSRA) strain that was used as a replacement for the qualifying strain, *S.aureus ATCC 6538,* utilized in the standards for sanitization and disinfection of hard surfaces, for both non-food and food-contact surfaces.

Results:

GMA Disinfection Test Summary

Product	***E.coli* ATCC *29214***		***S.aureus ATCC 33591***	
	% Reduction	**Log Reduction**	**% Reduction**	**Log Reduction**
GMA NaDCC Tablet (200 ppm)	100	5.66	99.9434	4.9250
GMA NaDCC Tablet (1000 ppm)	100	5.82	100	6.00
GMA NaDCC Tablet (2000 ppm)	100	5.66	100	6.00
GMA Peracetic Acid (1500 ppm)	16.3636	0.0736	88.6667	0.9533
Purell Food Surface Sanitizer (100%)	100	6.00	100	6.00
Bleach 7.5% (0.0625 gals)	100	6.00	100	6.00
Hydrogen Peroxide 3% (1%)	99.8381	2.7975	67.0952	0.4921
Ecolab Wash 'n Walk	98.5271	3.7527	100	6.00

GMA NaDCC at 200ppm, 1000ppm, and 2000ppm, along with Purell Food Surface Sanitizer, showed efficacy equivalent to 7.5% Bleach (0.0625 gal) in deactivating *E.coli ATCC 29214*. For *S. aureus ATCC 33591*, GMA NaDCC at 1000ppm and 2000ppm, as well as Purell Food Sanitizer, were as effective as 7.5% Bleach (0.0625 gal).

Per EPA guidelines, sanitizers for non-food contact hard surfaces should achieve a 3-log reduction (99.9%) within five minutes when tested against qualifying bacteria. The effective GMA NaDCC products

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would be the best products to move forward with certification testing at a registered EPA lab. The performance of GMA NaDCC tablets at 1000ppm and 2000ppm indicates the potential for a residual disinfectant claim, a 5-log reduction (99.999%) in less than 10 minutes.

Regarding performance testing of hard, food-contact surfaces with halide actives, the results should demonstrate product concentrations relative to sodium hypochlorite for *S. enterica* or *S. aureus.* For products lacking halide actives, a 5-log reduction within 30 seconds is the standard. Given the efficacy of GMA's NaDCC products at five minutes, the recommended next step for proof of concept performance testing is to conduct a test with a contact time of 30 seconds using GMA NaDCC 1000ppm and NaDCC 2000ppm against comparable concentrations of sodium hypochlorite on an *S. aureus* strain.

Summary:

Conclusion: GMA NaDCC tablets at 200 ppm, 1000 ppm, and 2000 ppm were as effective as Purell Food Surface Sanitizer (100%) and Bleach 7.5% (0.0625 gals) at deactivating *E.coli ATCC 29214* with a five-minute contact time on stainless steel. GMA NaDCC tablets at 1000ppm and 2000ppm were as effective as Purell Food Surface Sanitizer (100%), Bleach 7.5% (0.0625 gals), and Ecolab Wash 'n Walk at deactivating *S.aureus ATCC 33591* with a five-minute contact time on stainless steel. The GMA Peracetic Acid (1500 ppm) was not effective on either bacterium with a five-minute contact time and was less effective than all four comparative products.