CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2020

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ClientType: Lab

ProjectNumber: Project #2

Substrates: Stainless Steel

PartType: Part

Contaminants: MS2 Bacteriophage

Cleaning Methods: Low Pressure Spray

Analytical Methods: Organism count

Purpose: To evaluate the efficacy of all-purpose cleaners with inactivating a surrogate virus for COVID-19 on a hard surface without agitation.

Experimental Procedure:

Pour Plate Method - MS2 Bacteriophage

Six hours prior to one run (26 plates), E.coli 15597 was subcultured into three milliliters of tryptic soy broth (TSB) screw-cap tubes and incubated at 37°C (98.6°F). Four glass Petri dishes, each containing one stainless steel coupon, along with 27 screw-cap tubes filled with 10ml of 0.5X tryptic soy agar (TSA) were autoclaved. The biosafety cabinet (BSC) was sprayed with 70% v/v isopropyl alcohol using a paper towel before spraying any items going into the BSC. Once autoclaving was complete, the TSA tubes were placed into a 45°C (113°F) D.I. water bath inside the biosafety cabinet (BSC). The four glass Petri dishes were marked using a black sharpie to designate the positive (P+), negative (N-), Test 1 (T1), and Test 2 (T2). Ten microliters of the organism were pipetted onto the P+, T1, and T2 stainless steel coupons and air-dried for 15 minutes. A motorized pipette with 10ml tips was used to pipet 15 ml of Dey-Engley (D/E) neutralizing broth into four separate 50ml conical tubes labeled P+, N-, T1, and T2. Once the MS2 bacteriophage dried on the coupons, the P+ coupon was placed into the conical tube. The N-, T1, and T2 were pipetted with 1000µl of the cleaning solution onto each coupon for one minute before immediately placing them in the conical tube with an autoclaved forceps. The conical tubes were then placed on the shaker for 10 minutes. During this time, using the 1000ml pipette, 900ml of 1x phosphate-buffered saline (PBS) was pipetted into nine autoclaved dilution tubes, and serial dilutions were made for P+, T1, and T2 up to 10^{-4} using 100µl of the shaken D/E broth. Once the six-hour sub-time was complete, the E. coli 15597 subculture was removed from the incubator for use. For each variable (N-, P+, T1, and T2), 100µl of the stock and serial dilutions of MS2 bacteriophage, and 100µl of the E.coli 15597 subculture were combined into an empty dilution tube. A screwcap tube of 0.5X TSA was removed from the water bath, wiped with a paper towel to remove moisture, and poured into the dilution tube. The mixture was immediately poured into a sterile polystyrene petri dish; swirled to cover the entire plate surface, and then air-dried before covering. Dried Petri dishes were placed into a clean labeled zip lock bag that was partially closed and incubated at 37°C overnight. Plates were counted the following day based on the clear lysis zones in the bacterial lawn of growth (1 plate forming unit) to calculate log reduction and percent removal.

Results:

Product Name	New/ Old Bottle	Log Reduction	% Reduction
409 Multi-Surface	Old	6.44	100
7th Generation	New	0.6069	74.6951
Method All-Purpose	Old	0.505	67.5879
Method All-Purpose	New	1.3398	92.7273
Castille Lavender Soap	Old	0.97	89.0877
LightHaus Abracadabra	New	1.3341	95.3368
Annie's Pure and Simple	Old	1.3897	94.0945
Annie's Pure and Simple	New	TBD	TBD
Mrs. Myers Clean Day	New	TBD	TBD

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ThreeMain Multi-Surface	New	5.06	100

Products in the results labeled "old" were at least two years old since purchase and or opening. Products were considered "new" if they were purchased and or opened within a year. The cleaning products were all ready-to-use (RTU) except the Castille Lavender Soap which used Dr. Bronner's All-Purpose Cleaner dilution of ¼ cup of soap in a quart of water in a spray bottle. Annie's Pure and Simple "old" product was not shaken first before using for this test.

The 409 Multi-Surface cleaner contains quaternary ammonium compounds and is meant for disinfection whereas the all-purpose cleaners were designed without the intention of disinfecting.

Summary:

Substrates:	Stainless Steel				
Contaminants:	MS2 Bacteriophage				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Clorox Company	409 (Multi-Surface Cleaner)	100%	100.00	☑	
Seventh Generation	All-Purpose Natural Cleaner	100%	74.70	☐	
Method	Method All-Purpose Pink Grapefruit	100%	67.59	☐	
Method	Method All-Purpose Cleaner	100%	92.73	☐	
Dr. Bronner's	Dr. Bonner's 18-in-1 Hemp Pure Castile Soap	1/4 cup in 1 quart tap water	89.09	☐	
LightHaus Cleaning Products	Abracadabra All-Purpose Cleaner	100%	95.34	☐	
Annie's Pure and Simple	Annie's Pure and Simple All Purpose Product - Meyer Lemon	100% (Not Shaken)	94.09	☐	
Annie's Pure and Simple	Annie's Pure and Simple All Purpose Product - Meyer Lemon	100%		☐	
Mrs Myers Clean Day	Mrs Meyers Lemon Multisurface Cleaner	100%		☐	
ThreeMain Products	ThreeMain Products Multi-Surface Cleaner	100%	100.00	☑	

Conclusion:

409 Multi-Surface and Three Main Multi-Surface were the two effective all-purpose cleaners that had a 100% reduction of MS2 bacteriophage after one-minute contact on stainless steel. All of the other all-purpose cleaners performed between 0-1 Log reduction.