

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2024
 DateRun: 02/23/2024
 Experimenters: Aditi Patel, Jaimie Thibeault
 ClientType: Lab
 ProjectNumber: Project #12
 Substrates: Stainless Steel
 PartType: Coupon
 Contaminants: MS2 Bacteriophage
 Cleaning Methods: Pour Plate
 Analytical Methods: Organism count
 Purpose: To evaluate the efficacy of hydrogen peroxide cleaners with inactivating MS2 on a hard surface without agitation.

Experimental Procedure: Pour Plate Method - MS2 Bacteriophage

Six hours prior to the run, E.coli 15597 was subcultured into three milliliters of tryptic soy broth (TSB) screw-cap tubes and incubated at 37°C (98.6°F). 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 30 seconds 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 | Log Reduction | Percent Reduction |
|-----------------------------------------------------------------------|---------------|-------------------|
| Bona Power Plus Antibacterial Surface Cleaner | 7.3500 | 100.0000 |
| Bona Power Plus Hard-Surface Floor Cleaner | 6.9275 | 100.0000 |
| Earth Essentials Multi-purpose Disinfectant Cleaner | 7.1400 | 100.0000 |
| Homesolv by Citra Solv Multi-purpose disinfectant cleaner | 7.3167 | 100.0000 |
| Honest Disinfecting Spray (Without chlorine Bleach) | 7.1833 | 100.0000 |
| Kaboom (with the power of oxi-clean) | 6.0943 | 99.9412 |
| Libman Multisurface Disinfecting Cleaner | 7.3133 | 100.0000 |
| Lysol with Hydrogen Peroxide Multi-Purpose Cleaner | 6.5900 | 100.0000 |
| Oxivir 1 Disinfectant Cleaner | 7.3675 | 89.7584 |
| PERdiem® General Purpose Cleaner with Hydrogen Peroxide (Concentrate) | 7.4233 | 100.0000 |

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| PERdiem General Purpose Cleaner with Hydrogen Peroxide (1:64 Dilution - Spray Bottle) | 0.3626 | 55.6196 |
| Puracy Disinfecting Surface Cleaner | 6.8900 | 100.0000 |

Summary:

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|-----------------------------|-------------------------------------------------------------------|---------------|--------------------|-------------------------------------|----------------------|
| Substrates: | Stainless Steel | | | | |
| Contaminants: | MS2 Bacteriophage | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Bona US | Power Plus Antibacterial Surface Cleaner | 100% | 100.00 | <input checked="" type="checkbox"/> | |
| Bona US | Bona PowerPlus Antibacterial Hard-Surface Floor Cleaner | 100% | 100.00 | <input checked="" type="checkbox"/> | |
| CVS Health | Earth Essentials by Total Home Multi-Purpose Disinfectant Cleaner | 100% | 100.00 | <input checked="" type="checkbox"/> | |
| CitraSolv | HomeSolv by CitraSolv Multi-Purpose Disinfectant Cleaner | 100% | 100.00 | <input checked="" type="checkbox"/> | |
| The Honest Company, Inc. | Honest Disinfecting Spray | 100% | 100.00 | <input checked="" type="checkbox"/> | |
| Church & Dwight Co Inc. | Kaboom With the Power of OxiClean | 100% | 99.00 | <input type="checkbox"/> | |
| The Libman Company | Libman Multi-Surface Disinfecting Cleaner | 100% | 100.00 | <input checked="" type="checkbox"/> | |
| Reckitt Benckiser | Lysol with Hydrogen Peroxide Multi-Purpose Cleaner | 100% | 100.00 | <input checked="" type="checkbox"/> | |
| Sealed Care - Diversey Care | Perdiem General Purpose Cleaner w/ Hydrogen Peroxide | 100% | 100.00 | <input checked="" type="checkbox"/> | |
| Diversey Corporation | PERdiem General Purpose Cleaner with Hydrogen Peroxide | 1.5% | 55.62 | <input type="checkbox"/> | |
| Puracy | Puracy Disinfecting Surface Cleaner | 100% | 100.00 | <input checked="" type="checkbox"/> | |
| Diversey Corporation | Oxivir 1 RTU Disinfectant Cleaner | 100% | 89.76 | <input type="checkbox"/> | |

Conclusion:

Bona Power Plus Antibacterial Surface cleaner, Bona power plus hard surface floor cleaner, earth essentials, Homesolv, Honest, Libman, Lysol, concentrated PERdiem, and Puracy had 100% MS2 reduction. Diluted PERdiem had a 55.6196% reduction, Oxivir had a 89.7574% reduction, and Kaboom had a 99.9412% reduction.