

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004

DateRun: 10/28/2004

Experimenters: Jason Marshall, Lily Xu

ClientType: General

ProjectNumber: Project #1

Substrates: Ceramics, Fiberglass, Chrome

PartType: Coupon

Contaminants: Hucker's Soil

Cleaning Methods: Manual Wipe

Analytical Methods: Gravimetric

Purpose: To evaluate biobased alternatives for all purpose cleaning.

Experimental Procedure: The cleaning products were used at vendor recommended concentrations. Products that were not at 100% were diluted with DI (deionized) water for all purpose cleaning. Pre-weighed coupons of fiberglass, ceramic and chrome were coated with Hucker's Soil and allowed to dry overnight at ambient temperature. The contaminated coupons were weighed using a Denver Instrument Model A-250 analytical balance to determine the amount of soil added (i.e., initial weight).

The coupons were placed in a Gardner Straight Line Washability unit, as referenced in ASTM International (formerly the American Society for Testing and Materials) standards and by CSPA, the Consumer Specialty Products Association's (formerly CSMA) detergent compendium. A professional painter's rag was attached to the cleaning sled and soaked with 5-7 sprays of cleaning solutions. Each coupon was sprayed 7-10 times with the same cleaning solution. The cleaning unit was run for 20 cycles (approx. 33 seconds). The coupons were wiped once with a dry paper towel. Gravimetric weights were recorded once more, from which the remaining soil (i.e., final weight) can be determined.

Results: All of the products tested removed over 90% of the soil on average from the three surfaces. The table below lists the amount of soil added, the amount remaining and the efficiency for each coupon cleaned.

| | Fiberglass | | | Ceramic | | | Chrome | | |
|-----------------|------------|----------|-----------|------------|----------|-----------|------------|----------|-----------|
| Cleaner | Initial wt | Final wt | % Removed | Initial wt | Final wt | % Removed | Initial wt | Final wt | % Removed |
| Bi-O-Kleen AP | 0.1167 | 0.0030 | 97.43 | 0.1276 | 0.0048 | 96.24 | 0.0892 | 0.0002 | 99.78 |
| | 0.2294 | 0.0022 | 99.04 | 0.1521 | 0.0012 | 99.21 | 0.0747 | 0.0006 | 99.20 |
| | 0.1596 | 0.0022 | 98.62 | 0.1463 | 0.0011 | 99.25 | 0.0912 | 0.0012 | 98.68 |
| VPW SC 1000 | 0.1448 | 0.0020 | 98.62 | 0.1147 | 0.0010 | 99.13 | 0.0680 | 0.0000 | 100.00 |
| | 0.2485 | 0.0020 | 99.20 | 0.1752 | 0.0044 | 97.49 | 0.0924 | 0.0002 | 99.78 |
| | 0.2407 | 0.0007 | 99.71 | 0.1208 | 0.0028 | 97.68 | 0.1041 | 0.0002 | 99.81 |
| Eco All Purpose | 0.2010 | 0.0014 | 99.30 | 0.1267 | 0.0024 | 98.11 | 0.1089 | 0.0004 | 99.63 |
| | 0.1875 | 0.0028 | 98.51 | 0.1114 | 0.0005 | 99.55 | 0.1098 | 0.0001 | 99.91 |
| | 0.2123 | 0.0007 | 99.67 | 0.1648 | 0.0043 | 97.39 | 0.1102 | 0.0001 | 100.09 |

Overall Average from previous data sent to client on current cleaners
H2Orange2 concentration 2.9% efficiency 91.70%
Grout Safe 0.8% 95.28%

| | | | | | | |
|----------|------------------------|--------------------------------|---------------|--------------------|-------------------------------------|----------------------|
| Summary: | Substrates: | Ceramics, Fiberglass, Chrome | | | | |
| | Contaminants: | Hucker's Soil | | | | |
| | Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| | Bi-O-Kleen Industries | Bi-O-Kleen Cleaner & Degreaser | 2 | 98.61 | <input checked="" type="checkbox"/> | |
| | Orison Marketing | VPW SC 1000 | 20 | 99.05 | <input checked="" type="checkbox"/> | |
| | Lifetime Solutions Ltd | Eco All Purpose | 12 | 99.13 | <input checked="" type="checkbox"/> | |

Conclusion: The products tested had efficiencies greater than the client's current all purpose cleaner.