

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2010
DateRun: 10/14/2010
Experimenters: Jason Marshall, Junhee Cho, Timothy Weil, Chris Damp
ClientType: Cleaner Manufacturer
ProjectNumber: Project #1
Substrates: Ceramics, Plastic, Steel
PartType: Coupon
Contaminants: Hucker's Soil
Cleaning Methods: Manual Wipe
Analytical Methods: Gravimetric

Purpose: To evaluate selected products effectiveness to remove selected soils from selected substrates.

Experimental Procedure: Four products were evaluated for their effectiveness to remove soil from Painted Steel, Plastic and Ceramic. Three (DFC-14000 @ 2%, DFC-14000 @ 3% and Trader Joe's Multi-Purpose Cleaner RTU) were provided by the client and the fourth was M.D. Stetson Company's 3R's and was selected as a conventional product for comparative purposes.

For this evaluation a total of 36 coupons were soiled with Hucker soil, 12 Stainless Steel and 12 Plastic coupons and 12 Ceramic coupons were weighed and coated with Hucker's soil. After allowing 24 hours to dry, coupons were weighed a second time to determine the amount of soil added. Each set of three coupons were cleaned using abrasion testing using the following application and testing procedure.

First the cleaning solution was applied to the coupon and the cleaning pad and allowed to set for 1 minute (60 seconds) and then cleaned with 20 cycles each of abrasion cleaning using an inline abrasion tester machine. After allowing time for the coupons to dry final weights were recorded and efficiencies were calculated.

Results: Visually there was streaking and staining across the board by all cleaners on all substrates with the exception of the ceramic tiles. The table lists the amount of soil added, the amount remaining and the efficiency for each coupon cleaned.

| Cleaner | Initial wt | Final wt | % Removed |
|--------------------------------|------------|----------|-----------|
| Trader Joe's - Plastic | | | |
| | 0.0898 | 0.0061 | 93.21 |
| | 0.0539 | 0.0035 | 93.51 |
| | 0.1007 | 0.0097 | 90.37 |
| Trader Joe's - Painted Steel | | | |
| | 0.0766 | 0.0448 | 41.51 |
| | 0.0936 | 0.0076 | 91.88 |
| | 0.1125 | 0.0157 | 86.04 |
| Trader Joe's - Ceramic | | | |
| | 0.2242 | 0.0029 | 98.71 |
| | 0.0830 | 0.0254 | 69.40 |
| | 0.1951 | 0.0045 | 97.69 |
| 3R All Purpose - Plastic | | | |
| | 0.1028 | 0.0380 | 63.04 |
| | 0.0766 | 0.0105 | 86.29 |
| | 0.0731 | 0.0223 | 69.49 |
| 3R All Purpose - Painted Steel | | | |
| | 0.0702 | 0.0170 | 75.78 |
| | 0.0820 | 0.0012 | 98.54 |
| | 0.1045 | 0.0232 | 77.80 |
| 3R All Purpose - Ceramic | | | |
| | 0.2316 | 0.0260 | 88.77 |

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|------------------------------|--------|--------|-------|
| | 0.2129 | 0.0194 | 90.89 |
| | 0.1038 | 0.0081 | 92.20 |
| DFC 14000 2% - Plastic | | | |
| | 0.0502 | 0.0189 | 62.35 |
| | 0.0487 | 0.0066 | 86.45 |
| | 0.0628 | 0.0043 | 93.15 |
| DFC 14000 2% - Painted Steel | | | |
| | 0.0729 | 0.0061 | 91.63 |
| | 0.0830 | 0.0146 | 82.41 |
| | 0.0607 | 0.0100 | 83.53 |
| DFC 14000 2% - Ceramic | | | |
| | 0.1084 | 0.0115 | 89.39 |
| | 0.0892 | 0.0030 | 96.64 |
| | 0.0380 | 0.0154 | 59.47 |
| DFC 14000 3% - Plastic | | | |
| | 0.0831 | 0.0038 | 95.43 |
| | 0.1335 | 0.0137 | 89.74 |
| | 0.1477 | 0.0185 | 87.47 |
| DFC 14000 3% - Painted Steel | | | |
| | 0.1205 | 0.0073 | 93.94 |
| | 0.1179 | 0.0383 | 67.51 |
| | 0.1074 | 0.0107 | 90.04 |
| DFC 14000 3% - Ceramic | | | |
| | 0.1121 | 0.0121 | 89.21 |
| | 0.2216 | 0.0181 | 91.83 |
| | 0.1256 | 0.0133 | 89.41 |

Summary:

| Substrates: | Ceramics, Plastic, Steel | | | | |
|-----------------------|--------------------------|--------|-------------|-------------------------------------|---------------|
| Contaminants: | Hucker's Soil | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Chemspec | DFC 14000 | 2 | 82.78 | <input type="checkbox"/> | |
| Chemspec | DFC 14000 | 3 | 88.29 | <input checked="" type="checkbox"/> | |
| Next-Gen Supply Group | 3R All Purpose Cleaner | 2 | 82.53 | <input type="checkbox"/> | |

Conclusion:

The only product to remove over 85% of the Hucker's soil was the DFC 14000 at the 3% dilution. However, all of the green products performed as well or better than the conventional product.