# CLEANING LABORATORY EVALUATION SUMMARY

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|---|---|
| SCL #: | 2022 |
| DateRun: | 06/17/2022 |
| Experimenters: | Zoe Lawson |
| ClientType: | |
| ProjectNumber: | Project #4 |
| Substrates: | Vinyl Composite Tiles |
| PartType: | Coupon |
| Contaminants: | Greases, Food |
| Cleaning Methods: | Manual Wipe |
| Analytical Methods: | Gravimetric, Visual, Gloss-Color Meter |
| Purpose: | To evaluate various floor cleaners to determine the efficiency of the products. |

Experimental Procedure:

Painted vinyl composite tiles were substituted for masonite wallboard tiles. These tiles were soiled with a mixture of melted, oily soils containing a small amount of carbon black. The tiles were dried overnight at room temperature. A measured amount of spray-and-wipe cleaner is applied to a reinforced paper towel was used in place of the sponge. The soaked towels were used to scrub a portion of the soiled substrate using a straight-line washability apparatus. Separate soiled coupons were cleaned with the other products being evaluated instead of using the same soiled coupon as another product. This was done to eliminate any possible cross contamination of the cleaning process. Three coupons were cleaned by each cleaning product being evaluated. Cleaning performance was taken as a linear function of reflectance value, and visually evaluated by a panel of judges. In addition, gravimetric analysis will be conducted on all test panels to provide a secondary form of comparison. It will consist of initial weights, dirty weights and final clean weights. The amount of soil added will be compared to the amount removed (or remaining) and provide a percent removal.

Coupon preparation

Two coats of white paint solution were applied to the slightly rough side of the tiles, waiting 15 minutes between each coat. Coupons were allowed to dry at room temperature, and were cured at 50°C and 50% humidity for 2 hours. Five reflectance readings were taken for each of three separate tiles to obtain a baseline value.

Soil Preparation

A mixture of three cooking oils/greases was made. A melt blend of 33% vegetable shortening, 33% lard, 33% vegetable oil and 1% carbon lampblack was made up fresh for the testing. Care was taken in the application of the soil onto the coupons so that light and heavy areas were avoided. The soiled tiles were allowed to dry at room temperature. Five reflectance readings were made for each of three soiled tiles to obtain a soiled reference value.

Cleaning Test

A soiled tile was placed in the tray of the abrasion tester such that the direction of the soiling is perpendicular to the direction of the sponge. In place of using a sponge and pouring solution into dish for application, products were applied to the coated surfaces using a 3-5 sprays from manual spray pump and 4-7 sprays onto the reinforced Wypall X60 paper towel attached to the cleaning instrument. The cleaning was performed using Gardner Straightline washability unit and conducted for the prescribed 20 cycles.

Results:

Cleaning data can be calculated as percent removal in the following equation:

%Cont Removed = ((Initial soil wt - Final Soil wt)/Initial Soil wt) *100

Initial Soil weight of contaminant = Contaminated wt - Baseline wt

Final wt of contaminant = Cleaned wt - Initial w

Table 1: Cleaning Removal Results

| Product | Initial contaminant weight | Final contaminant weight | %Cont Removed | Average %Cont Removed |
|---|---|---|---|---|
| Freedom Mop Concentrate | 0.2001 | 0.0243 | 87.86 | 88.38 |
| | 0.2118 | 0.0220 | 89.61 | |
| | 0.2298 | 0.0283 | 87.68 | |
| 2.45 g Pod | 0.2810 | 0.0024 | 99.15 | 98.55 |
| | 0.1911 | 0.0037 | 98.06 | |
| | 0.3684 | 0.0057 | 98.45 | |
| 8.00 g Pod | 0.1130 | 0.0076 | 93.27 | 91.10 |

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| | 0.2336 | 0.0188 | 91.95 | |
| | 0.1744 | 0.0208 | 88.07 | |
| 10.00 g Pod* | 0.1545 | 0.0182 | 88.22 | 89.03 |
| | 0.1398 | 0.0172 | 87.70 | |
| | 0.1565 | 0.0138 | 91.18 | |
| 15.00 g Pod | 0.2310 | 0.0034 | 98.53 | 95.61 |
| | 0.1698 | 0.0089 | 94.76 | |
| | 0.2772 | 0.0179 | 93.54 | |
| Pine Sol Concentrate | 0.1561 | 0.0458 | 70.66 | 81.11 |
| | 0.2231 | 0.0202 | 90.95 | |
| | 0.2261 | 0.0413 | 81.73 | |

*10.00g Pod was redone to re-check results based off of the data put together once the 2.45g Pod was corrected.

Cleaning data can be calculated as percent detergency in the following equation:

% DET = R(cleaned) - R(soiled) / R(unsoiled) - R(soiled) X 100

Table 2: Percent Detergency Results

| Cleaner | Initial cont. weight | Final cont. weight | %DET | Average %DET |
|---|---|---|---|---|
| Freedom Mop | 43.90 | 4.32 | 90.16 | 93.17 |
| | 34.97 | 0.02 | 99.94 | |
| | 52.58 | 5.57 | 89.41 | |
| 2.45 g Pod | 54.25 | 1.73 | 96.81 | 96.13 |
| | 57.51 | 1.98 | 96.56 | |
| | 57.28 | 2.86 | 95.01 | |
| 8.00 g Pod | 33.41 | 6.26 | 81.26 | 86.14 |
| | 46.71 | 5.51 | 88.20 | |
| | 44.43 | 4.91 | 88.95 | |
| 10.00 g Pod* | 48.75 | 4.24 | 91.30 | 88.92 |
| | 49.31 | 4.87 | 90.12 | |
| | 49.52 | 7.26 | 85.34 | |
| 15.00 g Pod | 36.26 | 2.21 | 93.91 | 89.11 |
| | 30.23 | 4.06 | 86.57 | |
| | 41.81 | 5.50 | 86.85 | |
| Pine Sol | 32.89 | 2.68 | 91.85 | 88.98 |
| | 43.15 | 7.52 | 82.57 | |
| | 39.74 | 2.98 | 92.50 | |

Summary:

| **Substrates:** | Vinyl Composite Tiles | | | | |
|---|---|---|---|---|---|
| **Contaminants:** | Greases, Food | | | | |
| **Company Name:** | **Product Name:** | **Conc.:** | **Efficiency:** | **Effective:** | **Observations:** |
| Clorox Company | Pine Sol | 1.6 | 81.11 | ☐ | |

Conclusion:

The 2.45g Pod and the 15g Pod were the most effective at removing the contaminant from the vinyl painted tiles. The Freedom mop concentrate, 8g Pod, and 10g pod were slightly less effective but still performed well with high percent removals. The Pine Sol concentrate was the least effective among the products for removing the contaminant. The Freedom mop concentrate and the 2.45g Pod had the highest percent detergency, with the remaining products having similar but slightly decreased percent detergency results.