# CLEANING LABORATORY EVALUATION SUMMARY

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|---|---|
| SCL #: | 2009 |
| DateRun: | 07/05/2009 |
| Experimenters: | Junhee Cho |
| ClientType: | Cleaner Manufacturer |
| ProjectNumber: | Project #1 |
| Substrates: | Ceramics, Glass/Quartz, Stainless Steel |
| PartType: | Coupon |
| Contaminants: | Hucker's Soil, Food |
| Cleaning Methods: | Low Pressure Spray |
| Analytical Methods: | Gravimetric, Visual |
| Purpose: | To evaluate performance of supplied automatic dishwashing formula for three soil types. |

Experimental Procedure:

A supplied product and rinse aid and a traditional automatic dishwashing formulation were tested to determine cleaning efficiencies for three soils from three substrates. The first two soils were taken from ASTM D3556. The third, Hucker's soil, was the all purpose soil the lab uses for janitorial testing.

Standard Food Soil Preparation: A mixture of 80 weight % of margarine and 20 weight % of powdered milk was prepared. The margarine was warmed until fluid and the powdered milk was mixed thoroughly.

Use of this optional soil makes the test more realistic by adding another difficult-to-remove component. Optional Food Soil Preparation: This mixture consists of 70 % margarine, 15 % powdered milk, and 15 % cooked cereal. The cooked cereal was separately prepared as follows: Add 45 g of cereal to 228 g of water, heat to boiling, and boil for 5 min. Dissolve 100 g of powdered milk in 500 g of water and stir this solution into the cooked cereal. Continue stirring as portions are removed to be combined with margarine and powdered milk that have been blended as in the previous soil preparation. This mixture was made up as required.

Hucker's Soil Formulation: Jif Creamy Peanut Butter 9.2%, Salted Butter 9.2%, Arrowhead Mills stone ground wheat flour 9.2%, Egg Yolk 9.2%, Evaporated milk 13.8%, Distilled water 45.8%, Printer's ink with boiled linseed oil 0.9%, Shaws saline solution 2.7%

Preweighed ceramic (3), glass (3) and stainless steel (3) coupons (representing plates, glasses and silverware) were coated with each of the three soils and allowed to dry overnight. A second weight was recorded to determine the amount of soil added. All nine coupons were loaded into a VWR International Under-counter Glassware Washer (model 82020-922) and run on the light cycle (120 F wash, 140 F rinse). Total cleaning time lasted 2 hours. At the end of the cleaning, coupons were removed and weighed a final time to determine the amount of soil remaining. Percent efficiencies were calculated for each coupon cleaned. Observations were made for spotting or filming.

Results:

When the ceramic coupons were weighed after cleaning, the final weights were greater than the initial weights. The weight changes may have bee due to excess moisture being soaked into the uncoated side of the coupons, increasing the final weights. Visually, all the ceramic coupons for both cleaners were as clean as the glass and stainless steel coupons. Due to the weight change discrepancy, the gravimetric analysis of the ceramic coupons were not included in the overall efficiency calculations. The first table below lists the amount of soil added, the amount remaining and the efficiency for each coupon cleaned. The second table summarizes the cleaning performance of both product for each of three soils.

| Cleaner | Initial wt | Final wt | % Removed |
|---|---|---|---|
| Alpha Chemical Solid dish wahsing_Food soil 1_glass | 0.2085 | 0.0001 | 99.95 |
| | 0.2807 | -0.0001 | 100.04 |
| | 0.5622 | 0.0000 | 100.00 |
| Alpha Chemical Solid dish wahsing_Food soil 1_stainliess steel | 0.8854 | 0.0001 | 99.99 |
| | 0.9548 | -0.0003 | 100.03 |
| | 0.6165 | 0.0046 | 99.25 |
| Alpha Chemical Solid dish wahsing_Food soil 2_glass | 0.2707 | 0.0039 | 98.56 |
| | 0.1393 | 0.0000 | 100.00 |
| | 0.0534 | -0.0002 | 100.37 |
| Alpha Chemical Solid dish wahsing_Food soil 2_stainliess steel | 0.5788 | -0.0002 | 100.03 |
| | 0.2865 | 0.0001 | 99.97 |
| | 0.2415 | 0.0001 | 99.96 |
| Alpha Chemical Solid dish | 0.0791 | -0.0003 | 100.38 |

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| wahsing_Hucker soil_ glass | 0.0302 | -0.0006 | 101.99 |
| | 0.0475 | 0.0004 | 99.16 |
| Alpha Chemical Solid dish wahsing_Hucker soil_ stainliess steel | 0.0981 | 0.0725 | 26.10 |
| | 0.0537 | 0.0171 | 68.16 |
| | 0.1447 | 0.0746 | 48.45 |
| Alpha Chemical Liquid Detergent_Food soil 1_ glass | 0.4110 | 0.0001 | 99.98 |
| | 0.3998 | -0.0001 | 100.03 |
| | 0.9635 | 0.0000 | 100.00 |
| Alpha Chemical Liquid Detergent_Food soil 1_ stainless steel | 0.4895 | -0.0002 | 100.04 |
| | 0.6650 | 0.0066 | 99.01 |
| | 0.4965 | -0.0003 | 100.06 |
| Alpha Chemical Liquid Detergent_Food soil 2_ glass | 0.4606 | -0.0004 | 100.09 |
| | 0.3331 | 0.0002 | 99.94 |
| | 0.3463 | 0.0000 | 100.00 |
| Alpha Chemical Liquid Detergent_Food soil 2_ stainless steel | 0.4074 | 0.0011 | 99.73 |
| | 0.5840 | -0.0025 | 100.43 |
| | 0.6832 | 0.0587 | 91.41 |

Visual

| Ceramic Observations | Food Soil 1 | Food Soil 2 | Hucker's Soil |
|---|---|---|---|
| Alpha Chemical Solid dish washing | Good | Good | Good |
| Alpha Chemical Liquid Machine Detergent | Good | Good | Good |
| Alpha Chemical Liquid Machine Detergent HW | Good | Good | Good |

All three products had effective removal of the soils from ceramic coupons as determined by visual analysis.

Summary:

| **Substrates:** | Ceramics, Glass/Quartz, Stainless Steel | | | | |
|---|---|---|---|---|---|
| **Contaminants:** | Hucker's Soil, Food | | | | |
| **Company Name:** | **Product Name:** | **Conc.:** | **Efficiency:** | **Effective:** | **Observations:** |
| Alpha Chemical Services | Solid Machine Dish washer | 100 | 91.24 | ☑ | |
| Alpha Chemical Services | Liquid Machine Dishwasher | 100 | 98.45 | ☑ | |
| Alpha Chemical Services | Liquid Machine Dishwasher HW | 100 | 99.96 | ☑ | |

Conclusion: The supplied products worked as well as the traditional cleaning product removing close to 100% of each of the three soils.