

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2019
 DateRun: 08/21/2019
 Experimenters: Sabrina Apel, Julie Nguyen
 ClientType: Cleaner Manufacturer
 ProjectNumber: Project #1
 Substrates: Marble
 PartType: Coupon
 Contaminants: Calcium/lime
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric

Purpose: To evaluate K-cup cleaners on the effectiveness of their descaling performance using marble pieces.

Experimental Procedure: To test the descaling performance, the marble block test was used. In this test, a marble block is submerged for a period of time in two cleaner solutions. The weight of the marble block was measured before the immersion and after the immersion. Marble is chemically similar to hard water stains in that they both are made up of calcium carbonate. Results can be expressed in the number of grams lost over time during the immersion process. This method is widely used due to its simplicity but has some restrictions. One such limitation is how other soils typically mixed with hard water stains are not taken into consideration.

Several marble chunks of similar size were weighed to determine the baseline weight of each piece. The marble chunks were then immersed into two supplied products at vendor recommended dilutions and allowed to soak for two hours. The marble chunks were removed from the solutions after 5 minutes, and were rinsed to remove any loose material, dried using a Master Appliance Heat gun at 500 F, weighed, and reimmersed into the cleaner. This process was repeated after 10, 15, 30, 60, and 120 minutes. After the full 120 minutes, the marble chunks were removed from both solutions, rinsed, and dried. Final weights were recorded to determine weight loss. Three trials were performed for each supplied cleaner.

Results: Table 1: Gravimetrics of Each Trial

| Trial 1 | | | |
|---------------------------|------------------|------------|------------|
| Cleaner | Temperature (°C) | Time (min) | Weight (g) |
| Clean'n Brew Cleaning Cup | 80 | 0 | 22.8519 |
| | | 5 | 22.5883 |
| | | 10 | 22.4663 |
| | | 15 | 22.3926 |
| | | 30 | 22.2707 |
| | | 60 | 22.1433 |
| | | 120 | 22.0462 |
| Urnex K-cup Cleaning Cup | 80 | 0 | 17.6657 |
| | | 5 | 17.6610 |
| | | 10 | 17.6470 |
| | | 15 | 17.6468 |
| | | 30 | 17.6468 |
| | | 60 | 17.648 |
| | | 120 | 17.6474 |
| Trial 2 | | | |
| Cleaner | Temperature (°C) | Time (min) | Weight (g) |
| Clean'n Brew Cleaning Cup | 80 | 0 | 18.5314 |
| | | 5 | 18.3433 |
| | | 10 | 18.2174 |
| | | 15 | 18.1207 |
| | | 30 | 17.9878 |
| | | 60 | 17.8454 |
| | | 120 | 17.7225 |
| Urnex K-cup Cleaning Cup | 80 | 0 | 20.3789 |
| | | 5 | 20.3834 |

CLEANING LABORATORY EVALUATION SUMMARY

| | | | |
|---------------------------|------------------|------------|------------|
| | | 10 | 20.3820 |
| | | 15 | 20.3809 |
| | | 30 | 20.3803 |
| | | 60 | 20.3787 |
| | | 120 | 20.3785 |
| Trial 3 | | | |
| Cleaner | Temperature (°C) | Time (min) | Weight (g) |
| Clean'n Brew Cleaning Cup | 80 | 0 | 18.1032 |
| | | 5 | 17.8948 |
| | | 10 | 17.7317 |
| | | 15 | 17.5885 |
| | | 30 | 17.3679 |
| | | 60 | 17.1621 |
| | | 120 | 17.0944 |
| Urnex K-cup Cleaning Cup | 80 | 0 | 30.3569 |
| | | 5 | 30.3356 |
| | | 10 | 30.3289 |
| | | 15 | 30.3245 |
| | | 30 | 30.3239 |
| | | 60 | 30.3228 |
| | | 120 | 30.3217 |

Table 2: Images

| Trial | Cleaner | 0 min | 5 mins | 10 mins | 15 mins | 30 mins | 60 mins | 120 mins |
|-------|---------------------------|-------|--------|---------|---------|---------|---------|----------|
| 1 | Clean'n Brew Cleaning Cup | | | | | | | |
| | Urnex K-cup Cleaning Cup | | | | | | | |
| 2 | Clean'n Brew Cleaning Cup | | | | | | | |
| | Urnex K-cup Cleaning Cup | | | | | | | |
| 3 | Clean'n Brew Cleaning Cup | | | | | | | |
| | Urnex K-cup Cleaning Cup | | | | | | | |

Table 3: Gravimetric Results

| Cleaner | Trial | Initial Wt. Marble | Final Wt. Marble | Wt Loss | % weight loss | Average %wt loss |
|---------------------------|-------|--------------------|------------------|---------|---------------|------------------|
| Clean'n Brew Cleaning Cup | 1 | 22.8519 | 22.0462 | 0.8057 | 3.5 | 4.5 |
| | 2 | 18.5314 | 17.7225 | 0.8089 | 4.4 | |
| | 3 | 18.1032 | 17.0944 | 1.0088 | 5.6 | |
| Urnex K-cup Cleaning Cup | 1 | 17.6657 | 17.6474 | 0.0183 | 0.1 | 0.1 |
| | 2 | 20.3789 | 20.3785 | 0.0004 | 0.0 | |
| | 3 | 30.3569 | 30.3217 | 0.0352 | 0.1 | |

Summary:

CLEANING LABORATORY EVALUATION SUMMARY

| | | | | | |
|----------------------|---------------------------|---------------|--------------------|-------------------------------------|----------------------|
| Substrates: | Marble | | | | |
| Contaminants: | Calcium/lime | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Clean 'n Brew | Clean'n Brew Cleaning Cup | 100 | | <input checked="" type="checkbox"/> | Average %wt loss 4.5 |
| Urnex | Urnex K-Cup Cleaning Cup | 100 | | <input type="checkbox"/> | Average %wt loss 0.1 |

Conclusion:

Clean 'n Brew Cleaning Cup was the most effective cleaner in terms of weight loss in comparison to the Urnex K-cup Cleaning Cup cleaner. Clean 'n Brew Cleaning Cup had an average weight loss of 4.50%, and Urnex K-cup Cleaning Cup had an average weight loss of 0.1%. Clean 'n Brew Cleaning Cup would be recommended for descaling.