

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1995
 DateRun: 09/28/1995
 Experimenters: Donald Garlotta, Jay Jankauskas
 ClientType: Water Treatment Company
 ProjectNumber: Project #1
 Substrates: Stainless Steel
 PartType: Coupon
 Contaminants: Greases
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric
 Purpose: Does catalytic water treatment improves cleaning

Experimental Procedure: The purpose of this trial is to determine if the catalytic water treatment of the Hydrocat improves cleaning efficiencies of various aqueous cleaners. The four different cleaning chemistries used were:
 -WR Grace Daraclean #283 @ 10% by volume
 -Oakite Products Inproclean #3800 @ 10% by volume
 -Calgon Corp. Geo-Guard 3015 @ 10% by volume
 -Valtech Valtron SP2275 @ 10% per volume Two beakers of each cleaning chemistry were made up (one with Hydrocat treated water and the other with ordinary tap water). Three coupons were cleaned in each beaker of cleaning solution for a total of 24 coupons.
 Cleaning was performed for 10 minutes at 140 F (give or take 5 F) using stir-bar agitation. A constant setting on the stir plate was used on all beakers to ensure that all solutions obtained equal agitation. Rinsing was performed in a tap water tank without agitation for 2 minutes at 140 F. Coupons were then run under air knives for two minutes and placed in a convection oven where they were left until they were dry.
 Each coupon was weighed before and after contamination and after drying to obtain a percentage removal of the Valvoline Bearing Grease.
 After cleaning the beakers of cleaning solutions were covered with parafilm and left out on a counter for a few weeks. The beakers were inspected periodically to see if the Hydrocat treated solutions would retain a longer bath life than the tap-water solutions.

Results: GRAVIMETRIC RESULTS

Cleaning Solution: 10% solution of Daraclean 283 made up with Hydrocat water

Cleaning Temperature (°F): 137

| sample # | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|----------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| 4 | 60.4253 | 60.6091 | 60.5485 | 0.0606 | 32.97% |
| 28 | 59.9562 | 60.0914 | 60.0486 | 0.0428 | 31.66% |
| 6 | 60.4893 | 60.5923 | 60.5294 | 0.0629 | 61.07% |
| | | | | Average | 41.90% |
| | | | | StDev. | 16.61% |

Cleaning Solution: 10% solution of Daraclean 283 made up with tap water

Cleaning Temperature (°F): 140

| sample # | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|----------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| 10 | 60.0194 | 60.1828 | 60.1468 | 0.0360 | 22.03% |
| 11 | 60.7135 | 60.8512 | 60.7826 | 0.0686 | 49.82% |
| 12 | 60.2832 | 60.4391 | 60.3248 | 0.1143 | 73.32% |
| | | | | Average | 48.39% |
| | | | | StDev. | 25.67% |

Cleaning Solution: 10% solution of Valtech Corp. Valtron SP-2275 made up with Hydrocat water.

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Cleaning Temperature (°F): 136

| sample # | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|----------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| 19 | 60.2250 | 60.3664 | 60.2257 | 0.1407 | 99.51% |
| 20 | 60.4810 | 60.6690 | 60.4838 | 0.1852 | 98.51% |
| 21 | 60.2299 | 60.4352 | 60.2303 | 0.2049 | 99.81% |
| | | | | Average | 99.27% |
| | | | | StDev. | 0.68% |

Cleaning Solution: 10% solution of Valtech Corp. Valtron SP-2275 made up with tap water.

Cleaning Temperature (°F): 141

| sample # | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|----------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| 7 | 59.9125 | 60.0206 | 59.9131 | 0.1075 | 99.45% |
| 8 | 60.1149 | 60.2732 | 60.1159 | 0.1573 | 99.37% |
| 9 | 60.6615 | 60.7640 | 60.6621 | 0.1019 | 99.41% |
| | | | | Average | 99.41% |
| | | | | StDev. | 0.04% |

Cleaning Solution: 10% solution of Oakite Inproclean 3800 made up with Hydrocat water.

Cleaning Temperature (°F): 142

| sample # | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|----------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| 25 | 60.5273 | 60.6699 | 60.5481 | 0.1218 | 85.41% |
| 26 | 59.3082 | 59.4589 | 59.3220 | 0.1369 | 90.84% |
| 27 | 60.2475 | 60.4193 | 60.2853 | 0.134 | 78.00% |
| | | | | Average | 84.75% |
| | | | | StDev. | 6.45% |

Cleaning Solution: 10% solution of Oakite Inproclean 3800 made up with tap water.

Cleaning Temperature (°F): 140

| sample # | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|----------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| 13 | 60.3423 | 60.4886 | 60.3585 | 0.1301 | 88.93% |
| 14 | 60.5448 | 60.6613 | 60.5483 | 0.113 | 97.00% |
| 15 | 60.7070 | 60.8114 | 60.7076 | 0.1038 | 99.43% |
| | | | | Average | 95.12% |
| | | | | StDev. | 5.50% |

Cleaning Solution: 10% solution of Calgon Geo-Guard #2215 made up with Hydrocat water.

Cleaning Temperature (°F): 134

| sample # | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|----------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| 22 | 60.0150 | 60.2408 | 60.2377 | 0.0031 | 1.37% |
| 23 | 60.1111 | 60.2510 | 60.2484 | 0.0026 | 1.86% |
| 24 | 60.2343 | 60.4101 | 60.4076 | 0.0025 | 1.42% |
| | | | | Average | 1.55% |
| | | | | StDev. | 0.27% |

Cleaning Solution: 10% solution of Calgon Geo-Guard #2215 made up with tap water.

CLEANING LABORATORY EVALUATION SUMMARY

Cleaning Temperature (°F): 136

| sample # | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|----------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| 16 | 60.5809 | 60.8138 | 60.8105 | 0.0033 | 1.42% |
| 17 | 60.3642 | 60.5162 | 60.5146 | 0.0016 | 1.05% |
| 18 | 59.9102 | 60.0517 | 60.0479 | 0.0038 | 2.69% |
| | | | | Average | 1.72% |
| | | | | StDev. | 0.86% |

Summary:

| Substrates: | | Stainless Steel | | | |
|----------------------|-----------------|-----------------|-------------|--------------------------|---------------|
| Contaminants: | | Greases | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Magnaflux | Daraclean 283 | 10 | 41.90 | <input type="checkbox"/> | |
| Oakite Products | Inproclean 3800 | 10 | 84.75 | <input type="checkbox"/> | |
| Valtech Corporation | Valtron SP 2275 | 10 | 99.27 | <input type="checkbox"/> | |
| Calgon Corporation | Geo Guard 3015 | 10 | 1.72 | <input type="checkbox"/> | |
| Magnaflux | Daraclean 283 | 10 | 48.39 | <input type="checkbox"/> | w/ Hyrdocoat |
| Oakite Products | Inproclean 3800 | 10 | 95.12 | <input type="checkbox"/> | w/ Hyrdocoat |
| Valtech Corporation | Valtron SP 2275 | 10 | 99.41 | <input type="checkbox"/> | w/ Hydrocoat |
| Calgon Corporation | Geo Guard 3015 | 10 | 1.55 | <input type="checkbox"/> | w/ Hydrocoat |

Conclusion:

No noticeable improvements in cleaning efficiency were obtained by making up a cleaner solution with Hydrocat treated water.

On October 16th, cleaning solutions were inspected again to see if the bath lives of cleaner solutions were increased at all due to the water treatment of the hydrocat. Both beakers of the WR Grace #211 and the Valtron SP2275 were starting to cloud up indicating that they were starting to go bad. There was no noticeable difference in the cloudiness of the solutions made up with Hydrocat-treated water and the solutions made up with tap-water.