

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2016
 DateRun: 09/09/2016
 Experimenters: Carla De La Cruz
 ClientType: Jewelry Mfr
 ProjectNumber: Project #3
 Substrates: Aluminum
 PartType: Coupon
 Contaminants: Waxes
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric, Visual

Purpose: To find the best fit product for cleaning Leach Garner's #4 Master draw 419TT from aluminum surfaces meant to resemble the cleaning of precious metals.

Experimental Procedure: Coupons of stainless steel and copper were selected and arranged on trays, so that each cleaner had an assigned set of each surface. Before taking initial weights coupons were wiped down with Kimwipes. After taking weights the coupons were promptly soiled and reweighed. All cleaners were gathered in respective bottles and beakers. A stir bar was used in conjunction with a heating plate equipped to stir the solutions. The coupons were added to the beakers three of a kind at one time, and then allowed to sit in the stirred solution at room temperature for 15 minutes, in 5 minute increments while observations were taken. Finally, clean weights were taken at the end of all the testing.

| Cleaner | Initial wt of cont. | Final wt of cont. | % Cont Removed | % Overall |
|--------------|---------------------|-------------------|----------------|-----------|
| FluoSolv CX | 0.0609 | 0.0173 | 71.59 | |
| | 0.0913 | 0.0104 | 88.61 | 79.16 |
| | 0.0515 | 0.0117 | 77.28 | |
| FluoSolv NC | 0.0396 | 0.0074 | 81.31 | |
| | 0.0393 | 0.0076 | 80.66 | 81.83 |
| | 0.0437 | 0.0072 | 83.52 | |
| Vertrel Sion | 0.0639 | 0.0111 | 82.63 | |
| | 0.048 | 0.0093 | 80.63 | 82.79 |
| | 0.0672 | 0.01 | 85.12 | |
| Solstice PF | 0.0667 | 0.0322 | 51.72 | |
| | 0.047 | 0.0211 | 55.11 | 54.01 |
| | 0.0529 | 0.0237 | 55.2 | |

| Summary: | | Substrates: Aluminum | | | | |
|--------------------------------|--|-----------------------------|--------|-------------|--------------------------|---------------|
| | | Contaminants: Waxes | | | | |
| Company Name: | | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| NuGeneration Technologies, LLC | | FluoSolv CX | 100 | 79.16 | <input type="checkbox"/> | |
| NuGeneration Technologies, LLC | | FluoSolv NC 786 | 100 | 81.83 | <input type="checkbox"/> | |
| DuPont | | Vertrel Sion | 100 | 82.79 | <input type="checkbox"/> | |
| Honeywell | | Solstice PF with N2 | 100 | 54.01 | <input type="checkbox"/> | |

Conclusion: The last batch of testing associated with the Leach Garner project showed some similar results to the first time this soil was tested on copper and stainless steel. There did not seem to be much removal by any of the cleaners, as most left behind significant amounts of residue. The gravimetric values do not quite agree with what was observed, but according to the gravimetric analysis the best cleaner appeared to be DuPont's Vertrel Sion which removed about 80% of the soil, yet it too left behind some significant residue. It did seem to dissolve the soil somewhat but after 15 minutes there were no significant changes from the first 5 minutes of cleaning. It is suggested that this particular soil be cleaned under heated conditions as unheated cleaning is quite ineffective.