

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1995
 DateRun: 11/07/1995
 Experimenters: Jay Jankauskas
 ClientType: Silversmith
 ProjectNumber: Project #1
 Substrates: Copper, Sterling/Silver
 PartType: Coupon
 Contaminants: Buffing/Polishing Compounds
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric
 Purpose: Test 5 cleaners against current chemistry

Experimental Procedure: The purpose of this trial is to find a chemistry that is suitable for Silversmith's needs. This trial will test five different cleaning chemistries against Silversmith's current chemistry (Texo Corp. Texolite 1734SL.) The five cleaners selected were Calgon Geo-Guard 2215 (5%), Matchless MC 135 (4%), Matchless MC 580 (4%), Novamax Spectrum BCR (5%) and Calgon AK 6215 (4%). For each cleaner, 3 silver plated coupons will be cleaned for a total of 18 coupons. Cleaning will be performed at 134-143 F for ten minutes in a beaker agitated with a stir-bar. Identical stir-bar settings will be used on all cleaning solutions to ensure that all parts receive equal agitation. The coupons were rinsed for 30 seconds in a static tap water rinse set at 100 F. All coupons were weighed before and after contamination and after drying to obtain a percentage removal. The coupons were also visually inspected for any films that might have remained from ineffective rinsing. The three best cleaners will be used in an ultrasonic run with some contaminated silverware obtained from Silversmith. The parts were cleaned for 5 minutes at 140 F. Rinsing was performed for 30 seconds in a tap water bath at 100 F.

Results:

| GRAVIMETRIC RESULTS | | | | | |
|---|------------|-----------|--------------|--------------|-------------|
| Cleaning Solution: 4% Matchless MC 135 | | | | | |
| Cleaning Temperature (F): 143 | | | | | |
| Tap Water Rinse Temperature (F): 102 | | | | | |
| sample # / | clean mass | mass with | mass after | contaminant | Percent |
| substrate | (g) | cont (g) | cleaning (g) | removed (g) | Removal |
| 833 | 36.1331 | 36.3513 | 36.1426 | 0.2087 | 95.65% |
| 9696 | 36.1995 | 36.4386 | 36.2628 | 0.1758 | 73.53% |
| 7634 | 35.9915 | 36.1024 | 35.9984 | 0.104 | 93.78% |
| Average | | 87.65% | | | |
| StDev. | | 12.27% | | | |
| Cleaning Solution: 5% Solution of Calgon Geo-Guard 2215 | | | | | |
| Cleaning Temperature (F): 134 | | | | | |
| Tap Water Rinse Temperature (F): 102 | | | | | |
| sample # / | clean mass | mass with | mass after | contaminant | Percent |
| substrate | (g) | cont (g) | | cleaning (g) | removed (g) |
| 6169 | 36.1093 | 36.3447 | 36.1126 | 0.2321 | 98.60% |
| 9477 | 36.1331 | 36.3513 | 36.1426 | 0.2087 | 95.65% |
| 8840 | 36.1132 | 36.3226 | 36.1151 | 0.2075 | 99.09% |
| Average | 97.78% | | | | |
| StDev. | 1.86% | | | | |
| Cleaning Solution: 4% Solution of Matchless MC580 | | | | | |
| Cleaning Temperature (F): 141 | | | | | |
| Tap Water Rinse Temperature (F): 102 | | | | | |

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| sample # | clean mass | mass with | mass after | contaminant | Percent |
|-----------|------------|-----------|--------------|-------------|---------|
| substrate | (g) | cont (g) | cleaning (g) | removed (g) | Removal |
| 1447 | 36.3757 | 36.5388 | 36.3754 | 0.1634 | 100.18% |
| 8028 | 36.031 | 36.2547 | 36.0331 | 0.2216 | 99.06% |
| 6502 | 35.8792 | 36.2758 | 35.8954 | 0.3804 | 95.92% |
| Average | 98.39% | | | | |
| StDev. | 2.21% | | | | |

Cleaning Solution: 4% Solution of Calgon AK-6215

Cleaning Temperature (F): 143

Tap Water Rinse Temperature (F): 102

| sample # | clean mass | mass with | mass after | contaminant | Percent |
|-----------|------------|-----------|--------------|-------------|---------|
| substrate | (g) | cont (g) | cleaning (g) | removed (g) | Removal |
| 6282 | 35.8571 | 36.0822 | 35.8563 | 0.2259 | 100.36% |
| 578 | 36.2884 | 36.4821 | 36.2888 | 0.1933 | 99.79% |
| 6968 | 35.9252 | 36.0917 | 35.9234 | 0.1683 | 101.08% |
| Average | 100.41% | | | | |
| StDev | 0.65% | | | | |

Cleaning Solution: 5% Solution of Novamax Spectrum BCR

Cleaning Temperature (F): 140

Tap Water Rinse Temperature (F): 100

| sample # / | clean mass | mass with | mass after | contaminant | Percent |
|------------|------------|-----------|--------------|-------------|---------|
| substrate | (g) | cont (g) | cleaning (g) | removed (g) | Removal |
| 268 | 36.2572 | 36.4275 | 36.259 | 0.1685 | 98.94% |
| 1843 | 36.4164 | 36.5713 | 36.4189 | 0.1524 | 98.39% |
| 9967 | 36.2268 | 36.3532 | 36.2268 | 0.1264 | 100.00% |
| Average | 99.11% | | | | |
| StDev | 0.82% | | | | |

Cleaning Solution: 2% Solution of Texo Corp Texolite 1734SL

Cleaning Temperature (F): 137

Tap Water Rinse Temperature (F): 99

| sample # | clean mass | mass with | mass after | contaminant | Percent |
|-----------|------------|-----------|--------------|-------------|---------|
| substrate | (g) | cont (g) | cleaning (g) | removed (g) | Removal |
| 239 | 36.2552 | 36.4109 | 36.3018 | 0.1091 | 70.07% |
| 1450 | 36.3759 | 36.5232 | 36.4176 | 0.1056 | 71.69% |
| 9354 | 36.1662 | 36.3143 | 36.2236 | 0.0907 | 61.24% |
| Average | 67.67% | | | | |
| StDev. | 5.62% | | | | |

Summary:

| Substrates: | Copper, Sterling/Silver | | | | |
|--------------------------------|-----------------------------|--------|-------------|-------------------------------------|---------------|
| Contaminants: | Buffing/Polishing Compounds | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Calgon Corporation | Geo Guard 2215 | 5 | 97.78 | <input checked="" type="checkbox"/> | |
| Matchless Metal Polish Company | MC 132 | 4 | 87.65 | <input type="checkbox"/> | |
| Matchless Metal Polish Company | MC 580 | 4 | 98.39 | <input checked="" type="checkbox"/> | |
| Novamax Technologies Inc | Spectrum BCR | 5 | 99.11 | <input checked="" type="checkbox"/> | |
| Calgon Corporation | AK 6215 | 4 | 100.41 | <input type="checkbox"/> | |
| Texo Corporation | Texolite 1734 XL | 2 | 67.67 | <input type="checkbox"/> | |

Conclusion:

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Three chemistries were found to be the best performers (Matchless MC 580, Calgon AK- 6215 and Novamax Spectrum BCR). The Matchless MC 580 was visually the most effective cleaner especially when used with ultrasonics. The Calgon AK-6215 was the only low foaming cleaner out of the three. However, due to the fatty acids contained in the buffing compound, saponification took place and the Calgon AK-6215 had a higher foam level as the soil loading had increased.