

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021

DateRun: 01/08/2021

Experimenters: Justin Kiander

ClientType: Precision Instrument Manufacturer

ProjectNumber: Project #1

Substrates: Aluminum

PartType: Coupon

Contaminants: Oil

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric, Visual

Purpose: The purpose of this experiment was to determine the effectiveness of alternative cleaners on removing soil via unheated immersion.

Experimental Procedure: Cleaners were prepared to the following concentrations: Metalnox 6386 100%, Dimethyl Glutarate 100%, Ozzy Juice SW-3 100%, SC Aircraft & Metal Cleaner 20%, SC Supersolve 20%, Crystal Simple Green Industrial Cleaner 30 parts water. Three aluminum coupons were obtained and weighed for each of the cleaners being tested. Coupons were then soiled with V-4B oil and a dirty weight was recorded. Coupons were submerged into their respective cleaners for 15 minutes at room temperature. After 15 minutes had passed, coupons were dried in air for 24 hours. Once dry, a clean weight was recorded. Effectiveness of the cleaners was then determined.

Results:

| Cleaner | Initial wt of cont | Final wt of cont | %Cont Removed | %AVG |
|---------------------------------|--------------------|------------------|---------------|---------|
| Metalnox 6386 | 0.0079 | -0.0014 | 117.72 | 103.16% |
| | 0.0069 | 0.0001 | 98.55 | |
| | 0.0059 | 0.0004 | 93.22 | |
| Dimethyl Glutarate | 0.0072 | -0.0009 | 112.5 | 110.88% |
| | 0.0062 | -0.0008 | 112.9 | |
| | 0.0083 | -0.0006 | 107.23 | |
| Ozzy Juice SW-3 | 0.0062 | 0.0037 | 40.32 | 55.39% |
| | 0.0108 | 0.0031 | 71.3 | |
| | 0.0066 | 0.003 | 54.55 | |
| SC Aircraft & Metal | 0.0064 | 0.0016 | 75 | 68.33% |
| | 0.005 | 0.001 | 80 | |
| | 0.0046 | 0.0023 | 50 | |
| SC Supersolve | 0.0039 | 0.0038 | 2.56 | 32.93% |
| | 0.0047 | 0.0034 | 27.66 | |
| | 0.0035 | 0.0011 | 68.57 | |
| Crystal Simple Green Industrial | 0.0027 | 0.0002 | 92.59 | 103.07% |
| | 0.0041 | 0.0006 | 85.36 | |
| | 0.0032 | -0.001 | 131.25 | |

Dimethyl Glutarate was the most effective cleaner removing an average of 110.88% of soil from aluminum coupons. Metalnox 6386 was the second most effective removing 103.16% followed closely by Crystal Simple Green removing 103.07%. After 24 hours of drying, coupons cleaned with Dimethyl Glutarate still had solvent left behind, so additional time was allowed for a complete dry. The excess solvent most likely removed existing soil above the cleaned area adding to the excess soil removal. An improvement to the experiment would be to include an additional drying step, most likely a heat gun, for Dimethyl Glutarate to fully dry. Excess existing soil was also removed from Metalnox and Crystal Simple coupons adding to the increased removals.

For the remaining cleaners, although there was no visible oil residue after the cleaning process, removal was very poor. Removal could be increased by adding heat starting at 100°F. The SC products may benefit from a rinse step with deionized, as this has aided in previous experiments as well.

Summary:

| | | | | | |
|----------------------|----------------------|---------------|--------------------|-------------------|----------------------|
| Substrates: | | Aluminum | | | |
| Contaminants: | | Oil | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |

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|-----------------------|---|----------------|--------|-------------------------------------|--|
| Kyzen Corporation | Metalnox M6386 | 100% | 103.16 | <input checked="" type="checkbox"/> | |
| Fisher Scientific | Dimethyl glutarate (CAS:1119-40-0) | 100% | 110.88 | <input checked="" type="checkbox"/> | Coupons were allowed to dry over 24 hours, a heat gun is necessary to improve drying time. |
| Chem Free Corporation | SW-3 Ozzy Juice (Improved Low Odor) | 100% | 55.39 | <input type="checkbox"/> | Adding heat would benefit removal performance |
| Gemtek Products | SC Aircraft & Metal Cleaner Super Concentrate | 20% | 68.33 | <input type="checkbox"/> | Adding heat and a deionized water rinse would be beneficial to removal performance. |
| Gemtek Products | SC Supersolve Safety Solvent | 20% | 32.93 | <input type="checkbox"/> | Adding heat and a deionized water rinse would be beneficial to removal performance. |
| Simple Green | Crystal Simple Green Industrial Cleaner & Degreaser | 30 parts water | 103.07 | <input checked="" type="checkbox"/> | |

Conclusion:

Upon completion of testing, it was determined that Dimethyl Glutarate was the most effective cleaner followed by Metalnox 6386 and Crystal Simple Green Industrial. Next steps would be to conduct heated immersion to improve removal for remaining cleaners. A retest of unheated immersion to verify top cleaner performance without any preexisting soils would also be beneficial. A heat gun dry step is necessary for Dimethyl Glutarate to dry in a timely fashion.