

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2023

DateRun: 04/13/2023

Experimenters: Amelia Wagner

ClientType: Lab

ProjectNumber: Project #8

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Greases, Lubricating/Lapping Oils

Cleaning Methods: Ultrasonics

Analytical Methods: Gravimetric

Purpose: To evaluate the effectiveness of SB-16 (a FAME + Methyl Lactate mixture) in removing several production oils and greases from stainless steel coupons as a potential replacement for TCE using heated ultrasonics cleaning method.

Experimental Procedure: Three stainless steel coupons were used for each of the five soils being tested for a total of 15 coupons. The initial weights of each coupon were recorded. The bottom third of every coupon was soiled by applying the corresponding soil with a swab. The dirty weights of each coupon were then recorded. The coupons were then subjected to heated ultrasonics cleaning in a solution of Fatty Acid Methyl Ester 93% + Ethyl Lactate 7% for 15 minutes at 130 F. After the coupons were cleaned, they dried with a heat gun for about 2 minutes each. The next morning, the clean weights of each coupon were taken

| Soil | Use | CAS |
|------------------------------|----------------------------|--------------------------------------|
| Milform OAK 7a International | Stamping and drawing fluid | 64742-53-6 / 68909-65-9 |
| Milform Oak 529 | Evaporative lubricant | 68551-17-7 / 123-95-5 / 127087-87-0 |
| Milform Oak 15a | Metalworking oil | 64742-44-5 / 64742-52-5 / 64742-55-8 |
| Milform Oak 15c | Metalworking oil | 64742-52-5 / 64742-53-6 |
| M4 | | |

Results:

| Solvent | Substrate | Soil | Initial wt of cont. | Final wt of cont. | %Cont Removed | % AVG | % Overall |
|--|-----------------|----------------------|---------------------|-------------------|---------------|-------|-----------|
| Fatty Acid methyl ester 93% + Ethyl lactate 7% | Stainless Steel | Oak 7a international | 0.0753 | 0.0308 | 59.10 | 67.74 | 72.69 |
| | | Oak 7a international | 0.0635 | 0.0202 | 68.19 | | |
| | | Oak 7a international | 0.0781 | 0.0188 | 75.93 | | |
| | | M4 | 0.1500 | 0.0254 | 83.07 | 82.94 | |
| | | M4 | 0.2122 | 0.0416 | 80.40 | | |
| | | M4 | 0.1380 | 0.0202 | 85.36 | | |
| | | Oak 15C | 0.0709 | 0.0118 | 83.35 | 80.84 | |
| | | Oak 15C | 0.0775 | 0.0154 | 80.13 | | |
| | | Oak 15C | 0.1068 | 0.0224 | 79.03 | | |
| | | Oak 15A | 0.1911 | 0.0158 | 91.73 | 87.13 | |
| | | Oak 15A | 0.1891 | 0.0244 | 87.10 | | |
| | | Oak 15A | 0.1571 | 0.0274 | 82.56 | | |
| | | Oak 529 | 0.0273 | 0.0152 | 44.32 | 44.80 | |
| | | Oak 529 | 0.0309 | 0.0231 | 25.24 | | |
| | | Oak 529 | 0.0330 | 0.0116 | 64.85 | | |

When the coupons were dried with a heat gun for 2 minutes each, a white vapor was emitted in the fume hood.

Summary:

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|--------------------|-----------------|
| Substrates: | Stainless Steel |
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|----------------------|----------------------|-----------------------------------|--------------------|-------------------------------------|----------------------|
| Contaminants: | | Greases, Lubricating/Lapping Oils | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| TURI Cleaning lab | SB-16 | | 68.00 | <input type="checkbox"/> | on soil Oak 7A |
| TURI Cleaning lab | SB-16 | | 83.00 | <input checked="" type="checkbox"/> | on soil M4 |
| TURI Cleaning lab | SB-16 | | 80.00 | <input checked="" type="checkbox"/> | on soil Oak 15 C |
| TURI Cleaning lab | SB-16 | | 87.00 | <input checked="" type="checkbox"/> | on soil Oak 15 A |
| TURI Cleaning lab | SB-16 | | 45.00 | <input type="checkbox"/> | on soil Oak 529 |

Conclusion:

SB-16 (Fatty Acid Methyl Ester 93% + Ethyl Lactate 7%) is an effective cleaner for soils M4, Oak 15C, and Oak 15a if a drying step is feasible. It is not an effective cleaner for soils Oak 7a international and Oak 529.