

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2023

DateRun: 04/26/2023

Experimenters: Amelia Wagner, Siddhant Trivedi

ClientType: Lab

ProjectNumber: Project #8

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Greases, Lubricating/Lapping Oils, Oil

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To evaluate the effectiveness of SB-33 (a D limonene and Dimethyl Glutarate mixture) and SB-10 (a t-butyl acetate and Benzyl benzoate mixture) in removing several production oils and greases from stainless steel coupons as a potential replacement for TCE unheated immersion 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 heated immersion in SB-33 and SB-10 with the stir bar at 200rpm for 15 mins at 130F. 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

Results:

| Soil | Use | CAS | | | | |
|------------------------------|----------------------------|--------------------------------------|-------------------|---------------|-------|-----------|
| Milform OAK 7a International | Stamping and drawing fluid | 64742-53-6 / 68909-65-9 | | | | |
| M4 | | | | | | |
| Milform Oak 15c | Metalworking oil | 64742-52-5 / 64742-53-6 | | | | |
| Milform Oak 15a | Metalworking oil | 64742-44-5 / 64742-52-5 / 64742-55-8 | | | | |
| Milform Oak 529 | Evaporative lubricant | 68551-17-7 / 123-95-5 / 127087-87-0 | | | | |
| Cleaner | Soil | Initial wt of cont. | Final wt of cont. | %Cont Removed | % AVG | % Overall |
| SB-33 | Oak 7a international | 0.0390 | 0.0013 | 96.67 | 93.49 | 84.64 |
| | | 0.0876 | 0.0107 | 87.79 | | |
| | | 0.0677 | 0.0027 | 96.01 | | |
| | M4 | 0.3285 | 0.0090 | 97.26 | 98.29 | |
| | | 0.2656 | 0.0027 | 98.98 | | |
| | | 0.4822 | 0.0066 | 98.63 | | |
| | Oak 15c | 0.0467 | 0.0019 | 95.93 | 97.40 | |
| | | 0.1117 | 0.0016 | 98.57 | | |
| | | 0.1748 | 0.0040 | 97.71 | | |
| | Oak 15a | 0.0890 | 0.0014 | 98.43 | 98.27 | |
| | | 0.1177 | 0.0010 | 99.15 | | |
| | | 0.1116 | 0.0031 | 97.22 | | |
| | Oak 529 | 0.0071 | 0.0043 | 39.44 | 34.81 | |
| | | 0.0059 | 0.0035 | 40.68 | | |
| | | 0.0037 | 0.0028 | 24.32 | | |
| SB-10 | Oak 7a international | 0.0424 | 0.0063 | 85.14 | 94.45 | 93.47 |
| | | 0.0804 | 0.0011 | 98.63 | | |
| | | 0.0699 | 0.0003 | 99.57 | | |
| | M4 | 0.3605 | 0.0006 | 99.83 | 98.63 | |
| | | 0.2962 | 0.0022 | 99.26 | | |
| | | 0.3696 | 0.0118 | 96.81 | | |
| | Oak 15c | 0.0721 | 0.0069 | 90.43 | 87.30 | |
| | | | | | | |
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CLEANING LABORATORY EVALUATION SUMMARY

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|--|---------|--------|--------|-------|-------|
| | | 0.1227 | 0.0162 | 86.80 | |
| | | 0.1155 | 0.0177 | 84.68 | |
| | Oak 15a | 0.1725 | 0.0085 | 95.07 | 94.56 |
| | | 0.1763 | 0.0106 | 93.99 | |
| | | 0.1891 | 0.0102 | 94.61 | |
| | Oak 529 | 0.0090 | 0.0006 | 93.33 | 91.41 |
| | | 0.0076 | 0.0012 | 84.21 | |
| | | 0.0303 | 0.0010 | 96.70 | |

Summary:

| | | | | | |
|----------------------|----------------------|--|--------------------|-------------------------------------|----------------------|
| Substrates: | | Stainless Steel | | | |
| Contaminants: | | Greases, Lubricating/Lapping Oils, Oil | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| TURI Cleaning lab | SB-33 | 100% | 94.00 | <input checked="" type="checkbox"/> | on soil Oak 7 A |
| TURI Cleaning lab | SB-33 | 100% | 98.00 | <input checked="" type="checkbox"/> | on soil M4 |
| TURI Cleaning lab | SB-33 | 100 | 97.00 | <input checked="" type="checkbox"/> | on soil Oak 15 C |
| TURI Cleaning lab | SB-33 | 100 | 98.00 | <input checked="" type="checkbox"/> | on soil Oak 15A |
| TURI Cleaning lab | SB-33 | 100 | 93.00 | <input checked="" type="checkbox"/> | on soil Oak 529 |
| TURI Cleaning lab | SB-10 | 100 | 94.00 | <input checked="" type="checkbox"/> | on soil Oak 7 A |
| TURI Cleaning lab | SB-10 | 100 | 98.00 | <input checked="" type="checkbox"/> | on soil M4 |
| TURI Cleaning lab | SB-10 | 100 | 87.00 | <input checked="" type="checkbox"/> | on soil Oak 15 C |
| TURI Cleaning lab | SB-10 | 100 | 95.00 | <input checked="" type="checkbox"/> | on soil Oak 15 A |
| TURI Cleaning lab | SB-10 | 100 | 91.00 | <input checked="" type="checkbox"/> | on soil Oak 529 |

Conclusion:

SB-33 is an effective alternative to TCE in removing all soils except for M4 using heated immersion. SB-10 is an effective alternative to TCE in removing all soils using heated immersion