CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2026

DateRun: 07/15/2026

Experimenters: Amelia Wagner

ClientType: Brass Instrument Manufacturer

ProjectNumber: Project #4

Substrates: Brass

PartType: Coupon

Contaminants: Lubricating/Lapping Oils

Cleaning Methods: Manual Wipe

Analytical Methods: Gravimetric

Purpose: To test the efficacy of aqueous cleaners, solvents, alternative solvents, and modified alcohols in removing Drawell Heavy Machining Oil from brass coupons.

Experimental Procedure:

Preparation:

Brass coupons were used for the testing of several cleaning chemistries to remove a Drawell Heavy Machining Oil. Three coupons were used per each cleaning chemistry. Each coupon was weighed using a gravimetric balance and had their initial weights recorded. Drawell Heavy Machining Oil was applied to each coupon by swiping a swab across the bottom third of each coupon (avg ~0.15 grams of oil). Each coupon was then re-weighed and had their dirty weights recorded.

Cleaning Procedure:

Each coupon was cleaned via the method of manual wiping with a Wypall, with each Wypall having 2.5ml of cleaning solution applied. A new Wypall was used for each coupon. Each coupon was wiped down five times with a saturated Wypall. After cleaning, the coupons were re-weighed and had their clean weights recorded.

Results:

Cleaner	Initial wt of cont.	Final wt of cont.	%Cont Removed	% AVG
Dimethyl Glutarate (Solvent)	0.2009	0.0012	99.40	98.72
	0.1401	0.0018	98.72	
	0.2334	0.0046	98.03	
Micro 90 2% solution	0.1125	0.0107	90.49	92.66
	0.1861	0.0078	95.81	
	0.1479	0.0123	91.68	
Crystal Simple Green 10% solution	0.1119	0.0058	94.82	96.69
	0.1552	0.0026	98.32	
	0.1503	0.0046	96.94	
Metalnox M6386 (mod. alc.)	0.0837	0.0003	99.64	99.65
	0.0921	0.0002	99.78	
	0.0848	0.0004	99.53	

No visible or tactile residue of the Drawell Heavy Machining Oil present after cleaning

No visible or tactile residue of any of the cleaning solutions present after cleaning

EHS:

	Zep ID Red	Safety Kleen Premium Solvent	Dimethyl Glutarate	Crystal Simple Green Industrial Cleaner & Degreaser	Metalnox M6386 (modified alcohol)
Acute Human Effects	8	8	2	5	8
Chronic Human Effects	10	10	2	5	2
Ecological Hazards	8	8	3	2	4
	8	8	8	2	5

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Environmental Fate & Transport					
Atmospheric Hazard	2	2	2	2	2
Physical Properties	9	8	5	6	8
Process Factors	6	6	4	5	4
Life Cycle Factors	7	7	3	4	4
Overall Hazard Score	7.3	7.1	3.6	3.9	4.6

Summary:

Substrates:	Brass
Contaminants:	Lubricating/Lapping Oils

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
ZEP Manufacturing Company	Zep ID Red		0.00	☑	Estimated Cost: $112/Gal
Safety Kleen Corporation	Safety-Kleen Premium Solvent		0.00	☑	Estimated Cost: $12/Gal
Simple Green	Crystal Simple Green Industrial Cleaner & Degreaser	10% Solution	96.69	☑	Estimated Cost: $21/Gal
Kyzen Corporation	Metalnox M6386		99.65	☑	Estimated Cost: ~$5-$20/Gal Price unavailable from Kyzen, costs estimated from main component (Propylene Glycol Butyl Ether) and a comparative modified alcohol product from Dow (Dowanol PnBGE)
Fisher Scientific	Dimethyl glutarate (CAS: 1119-40-0)		98.72	☑	Estimated Cost: $524/Gal

Conclusion:

The Metalnox M6386 (modified alcohol) was the most effective in removing the machining oil. The modified alcohol can be used as a short-term solution using manual wiping and can be transitioned into a long-term solution using vacuum vapor degreasing or a closed ultrasonics system.

The Crystal Simple Green was also effective and can be used as a short term solution. Although its performance shows a slightly lower removal percentage than the Metalnox M6386, there was no visible or tactile difference between the coupons cleaned these chemistries. Crystal Simple Green is priced at a lower price point than the currently used Zep ID Red.

The Dimethyl Glutarate (solvent) was also highly effective but can be quite expensive. Future testing can focus on StaSol, a commercial (less costly) form of Dimethyl Glutarate.