CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2022
DateRun:	03/01/2022
Experimenters:	Zoe Lawson
ClientType:	Lab
ProjectNumber:	Project #8
Substrates:	Stainless Steel
PartType:	Coupon
Contaminants:	Buffing/Polishing Compounds
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric, Visual
Purpose:	To test the removal of buffing compound by the first 8 selected HSPiP formulations.

Experimental Procedure:

For silver bullet testing approximately 32 chemical combinations were determined via HSPiP. The first predetermined solvent combinations were selected based on their initial solvent in common. In this case, the eight chosen all contained D-limonene.

- Solvent 1 (91% D-limonene and 9% Acetone)
- Solvent 2 (67% D-limonene and 33% Benzyl Benzoate)
- Solvent 3 (85% D-limonene and 15% Dimethyl Glutarate)
- Solvent 4 (92% D-limonene and 8% 1-Propanol)
- Solvent 5 (48% D-limonene, 38% Benzyl Benzoate, and 14% Sec-Butyl Acetate)
- Solvent 6 (85% D-limonene, 14% Dimethyl Glutarate, and 1% Sec-Butyl Acetate)
- Solvent 7 (60% D-limonene, 31% Benzyl Benzoate, and 9% Dimethyl Glutarate)
- Solvent 8 (83% D-limonene, 16% Benzyl Alcohol, and 1% Dimethyl Glutarate)

All mixtures were tested as compatible with both stainless steel aluminum. The initial contaminant to be tested with these 8 solvents was a buffing compound. Several trials were conducted to determine how to best coat the stainless steel coupons with the buffing compound evenly. Buffing compound is solid at room temperature and melts at temperatures 100F and up. Once heated it has a consistency similar to peanut butter. Unless heat is maintained the contaminant will return to its solid state very rapidly. Coupons were weighed prior to application. For application, the buffing compound was heated with a heat gun until it began to melt and the bottom 1/3rd of the coupons were coated using a knife. The coupons were then weighed again.

Testing was attempted using unheated immersion but due to the properties of the buffing compound, without heat the cleaners did little to remove any soil. Thus, official testing began with heated immersion for 15 minutes. All 8 solvents were heated to 38°C (~100°F) in separate beakers. Coupons were then immersed for 15 minutes and taken out to dry overnight. Clean weights were then taken the next day.

Results:

Overall, solvents 1,2,3, and 6 were the most effective with very high % average removals. Solvents 4 and 8 were slightly less effective but still removed almost all of the contaminant. Solvents 5 and 7 were not very effective in removing the buffing compound with % removals at 61.84% and 32.53%.

Solvent	Initial cont.	Final cont.	%Cont Removed	% Average
1	0.6226	0.0077	98.76	98.52
	0.9895	0.0110	98.89	
	1.0085	0.0212	97.90	
2	0.8043	0.0193	97.60	98.15
	0.7766	0.0156	97.99	
	0.9915	0.0112	98.87	
3	0.7529	0.0048	99.36	99.28
	0.9947	0.0114	98.85	
	0.9754	0.0036	99.63	
4	0.9329	0.1055	88.69	90.51
	0.9644	0.0032	99.67	
	0.8710	0.1465	83.18	
5	1.1673	0.3606	69.11	61.84
	0.9388	0.0574	93.89	
	0.8902	0.6898	22.51	
6	1.0353	0.0180	98.26	98.83
	0.6990	0.0082	98.83	

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	0.9341	0.0057	99.39	
7	0.9404	0.3106	66.97	32.53
	0.8237	0.7050	14.41	
	1.0293	0.8624	16.21	
8	1.0368	0.0391	96.23	91.53
	1.1948	0.0102	99.15	
	1.1854	0.2463	79.22	

Summary:

Substrates:	Stainless Steel
Contaminants:	Buffing/Polishing Compounds

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
TURI Cleaning lab	SB-34	91% D-limonene and 9% Acetone	98.52	☑	
TURI Cleaning lab	SB-35	67% D-limonene and 33% Benzyl Benzoate	98.15	☑	
TURI Cleaning lab	SB-33	85% D-limonene and 15% Dimethyl Glutarate	99.28	☑	
TURI Cleaning lab	SB-36	92% D-limonene and 8% 1-Propanol	90.51	☑	
TURI Cleaning lab	SB-37	48% D-limonene, 38% Benzyl Benzoate, and 14% Sec-Butyl Acetate	61.84	☐	
TURI Cleaning lab	SB-38	85% D-limonene, 14% Dimethyl Glutarate, and 1% Sec-Butyl Acetate	98.83	☑	
TURI Cleaning lab	SB-39	60% D-limonene, 31% Benzyl Benzoate, and 9% Dimethyl Glutarate	32.53	☐	
TURI Cleaning lab	SB-40	83% D-limonene, 16% Benzyl Alcohol, and 1% Dimethyl Glutarate	91.53	☑	

Conclusion: Results from this test were promising and adding agitation in the next test would very likely be enough to remove all soil.