CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2022
DateRun:	03/10/2022
Experimenters:	Zoe Lawson, Tatyanna Moreland Junior
ClientType:	Lab
ProjectNumber:	Project #8
Substrates:	Stainless Steel
PartType:	Coupon
Contaminants:	Buffing/Polishing Compounds
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric, Visual, HSPiP
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 and 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 heated immersion and agitation. Testing began with heated immersion for 15 minutes. All 8 solvents were heated to 38°C (~100°F) in separate beakers each with a stir bar. Coupons were then immersed for 15 minutes and taken out to dry overnight. Clean weights were then taken the next day.

Results:

Overall, solvents 1,3,4,6, and 8 were the most successful at removing the contaminant from the coupons. All had overall averages of 99% and above and were visually clean.

Solvent	Initial	Dirty	Clean	%Cont Removed	% Average
1	59.8741	60.6385	59.8889	98.06	99.16
	64.2479	65.2430	64.2510	99.69	
	62.5696	63.8546	62.5730	99.74	
2	59.5571	60.6692	59.5717	98.69	74.67
	62.6273	63.7148	63.0858	57.84	
	48.0669	49.2687	48.4576	67.49	
3	61.4056	62.7620	61.4115	99.57	99.48
	63.8754	65.2828	63.8815	99.57	
	60.8231	62.0487	60.8314	99.32	
4	63.6883	64.6625	63.6970	99.11	99.53
	60.6820	62.1820	60.6882	99.59	
	61.2520	62.4503	61.2534	99.88	
5	60.3449	62.1062	61.8450	14.83	44.16
	63.8987	65.3898	63.9122	99.09	
	61.3968	62.8461	62.5771	18.56	
6	61.2200	62.2431	61.2271	99.31	99.55
	61.5231	62.9318	61.5230	100.01	
	61.5559	62.7099	61.5634	99.35	

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7	61.6283	62.5399	61.6525	97.35	75.74
	47.9741	49.1548	48.7189	36.92	
	48.1116	49.0016	48.1742	92.97	
8	48.1274	49.7392	48.1395	99.25	99.56
	61.4065	62.6406	61.4100	99.72	
	60.7791	62.0579	60.7827	99.72	

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	99.16	☑	
TURI Cleaning lab	SB-35	67% D-limonene and 33% Benzyl Benzoate	74.67	☐	
TURI Cleaning lab	SB-33	85% D-limonene and 15% Dimethyl Glutarate	99.48	☑	
TURI Cleaning lab	SB-36	92% D-limonene and 8% 1-Propanol	99.53	☑	
TURI Cleaning lab	SB-37	48% D-limonene, 38% Benzyl Benzoate, and 14% Sec-Butyl Acetate	44.16	☐	
TURI Cleaning lab	SB-38	85% D-limonene, 14% Dimethyl Glutarate, and 1% Sec-Butyl Acetate	99.55	☑	
TURI Cleaning lab	SB-39	60% D-limonene, 31% Benzyl Benzoate, and 9% Dimethyl Glutarate	75.74	☑	
TURI Cleaning lab	SB-40	83% D-limonene, 16% Benzyl Alcohol, and 1% Dimethyl Glutarate	99.56	☑	

Conclusion:

Solvents 1,3,4,6, and 8 were extremely efficient at removing the contaminant from the stainless steel coupons. The next step using these 8 cleaners would be to either begin testing on another substrate or to switch contaminants.