

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2024

DateRun: 11/21/2024

Experimenters: Amelia Wagner

ClientType: Textile Mfr

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Plastic

Cleaning Methods: Manual Wipe

Analytical Methods: Gravimetric, Timing

Purpose: To test the efficacy of other solvents to manually remove three types of polymers from stainless steel

Experimental Procedure: Three 304 stainless steel coupons were assigned to each of the soils per solvent resulting in a total of 27 coupons total. Each coupon was weighed with a mass balance and had their initial weights recorded. Each coupon was then soiled with its respective polymer and catalyst mixture. To soil each coupon, a pipette was used to apply a 0.5ml of the correct polymer catalyst mixture in a stripe across the middle of the coupons. The stripe of soil was then spread with a paint scraper to apply a thin coating to the bottom half of the coupon. After drying for 30 seconds, the next layer was applied. Each coupon was soiled with a total of 5 layers. After the soil was applied, the coupons were placed in the oven at 325F for 5 mins to cure the polymers. Each coupon had their dirty weights recorded. Each coupon was then timed while manually wiped with a cotton rag dipped in the respective solvent with circular motions. Manual wiping was ceased when all visible soil was removed from a coupon. If all visible soil was not able to be fully removed at 5 mins (300 seconds), cleaning was ceased. Coupons were then left to air dry for 30 mins before recording their clean weights.

Results:

Cleaner	Soil	Initial wt of cont.	Final wt of cont.	%Cont Removed	% AVG	% Overall	Time until clean	Secs AVG	Secs Overall
Dimethyl Succinate	7195 NF Alum	0.0575	0.0061	89.39	17.96	46.13	202	267	187
		0.1026	0.1346	-31.19			300		
		0.0973	0.1015	-4.32			300		
	7229	0.0847	0.0119	85.95	26.56		194	265	
		0.0849	0.0865	-1.88			300		
		0.0956	0.0998	-4.39			300		
	7223	0.1759	0.0104	94.09	93.87		35	28	
		0.1445	0.0099	93.15			22		
		0.1675	0.0094	94.39			26		
Sta Sol	7195 NF Alum	0.1285	0.0114	91.13	60.47	44.78	58	165	164
		0.1013	0.0131	87.07			138		
		0.0716	0.0693	3.21			300		
	7229	0.0806	0.1005	-24.69	-14.99		300	300	
		0.1262	0.1503	-19.10			300		
		0.1112	0.1125	-1.17			300		
	7223	0.1118	0.0130	88.37	88.85		20	26	
		0.1252	0.0141	88.74			46		
		0.1440	0.0152	89.44			13		

The polymers 719f NF Alum and 7229 absorbed the cleaning liquid during the cleaning cycle causing the clean weights to be heavier than the initial weights, resulting in negative percentages of contaminant removed.

Neither Dimethyl Succinate nor Sta Sol evaporated after 30 mins of air drying, so all coupons were dried with a heat gun before taking clean weights.

Summary:

Substrates:	Stainless Steel				
Contaminants:	Plastic				
Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
JR Hess & Co., Inc.	Sta-Sol ESS 160	100%	44.78	<input type="checkbox"/>	
Fisher Scientific	Dimethyl Succinate (CAS: 106-65-0)	100%	46.13	<input type="checkbox"/>	

Conclusion:

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Neither Dimethyl Succinate nor Sta Sol are effective in removing all three polymer soils from stainless steel. Both were only successful in removing the 7223 soil.