CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2024

DateRun: 12/09/2024

Experimenters: Amelia Wagner

ClientType: Textile Mfr

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Coatings, 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
Ethyl Acetate	7195NF Alum	0.0686	0.0005	99.2711	99.50	99.30	14	13	16
		0.0699	0.0003	99.5708			15		
		0.0857	0.0003	99.6499			9		
	7229	0.0917	0.0005	99.4547	99.10		27	25	
		0.0796	0.0008	98.9950			24		
		0.0869	0.0010	98.8493			24		
	7223	0.2100	0.0017	99.1905	99.31		12	11	
		0.2505	0.0012	99.5210			9		
		0.3230	0.0025	99.2260			11		
Cyclopentanone	7159NF Alum	0.1138	0.0071	93.7610	70.46	73.37	25	19	23
		0.0752	0.0181	75.9309			19		
		0.0494	0.0288	41.7004			14		
	7229	0.1252	0.0387	69.0895	70.30		24	22	
		0.1108	0.0310	72.0217			19		
		0.1294	0.0391	69.7836			24		
	7223	0.2043	0.0397	80.5678	79.35		21	26	
		0.2509	0.0334	86.6879			22		
		0.2520	0.0736	70.7937			36		

Cyclopentanone fully dissolve all polymers, rather than causing the polymers to peel off like other successful solvents. Although the Cyclopentanone was able to fully dissolve each polymer and was able to evaporate quickly, some of the dissolved remnants of the polymers remained on the coupons lowering the percentage of soil removed. To successfully integrate cyclopentanone into practice, it would require a rinse step post cleaning.

Summary:

Substrates:	Stainless Steel				
Contaminants:	Coatings, Plastic				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Alfa Aesar	Ethyl Acetate	99%	99.30	☑	16 seconds until clean
Aldrich Chemical Company Inc.	Cyclopentanone	99%	73.37	☐	23 seconds until clean

Conclusion:

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Ethyl Acetate is highly effective in removing all three polymer types from stainless steel. Cyclopentanone is not effective in removing the three polymer types from stainless steel without an additional rinse step.