

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.

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																		
	<table border="1" style="width: 100%;"> <thead> <tr> <th>Company Name:</th> <th>Product Name:</th> <th>Conc.:</th> <th>Efficiency:</th> <th>Effective:</th> <th>Observations:</th> </tr> </thead> <tbody> <tr> <td>Alfa Aesar</td> <td>Ethyl Acetate</td> <td>99%</td> <td>99.30</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>16 seconds until clean</td> </tr> <tr> <td>Aldrich Chemical Company Inc.</td> <td>Cyclopentanone</td> <td>99%</td> <td>73.37</td> <td style="text-align: center;"><input type="checkbox"/></td> <td>23 seconds until clean</td> </tr> </tbody> </table>	Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:	Alfa Aesar	Ethyl Acetate	99%	99.30	<input checked="" type="checkbox"/>	16 seconds until clean	Aldrich Chemical Company Inc.	Cyclopentanone	99%	73.37	<input type="checkbox"/>	23 seconds until clean
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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.