CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2015
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Experimenters:	Loc Nguyen, George Liang, Abigail Giarrosso, Rhoda Gindi
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Stainless Steel
PartType:	Coupon
Contaminants:	Oil
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric
Purpose:	To evaluate the efficiency one cleaner on GS 34 Soil-1 and Soil-2 from stainless steel coupons using immersion technique.
Experimental Procedure:	Twenty-two sets of stainless-steel coupons were weighed; each set consist of three coupons. Eleven sets of coupons were soiled with GS 34 Soil-1 and another eleven set was soiled with HS 34 Soil-2. Both soils were applied at the loading of ~100mg. The soiled coupons were oven dried for 30 minutes at 40 °C for GS 34 Soil-1 and 105°C for GS 34 Soil-2. Dirty weights were recorded for all of coupons after 15 minutes of cooling. Each set of cooled coupons were then immersed into 500 mL of its respective cleaning agent for 30 minutes standing up and soiled side facing away from one another inside the beaker. After immersion, coupons were rinsed into 500 mL water for 5 minutes. After rinsing, coupons were left to bake for an additional 30 minutes at 105 oC. It was left out to cool for another additional 15 minutes then weighed for final weights. After sitting out overnight, the cleaned coupons were weighed again for a second final weight. Thereafter the cleaned coupons were applied with a pressured towel manually onto each set of three coupons then weighted again for a third final reading to get rid of excess cleaning agents. Some of the products were tested at a temperature of 105 C. Soil 1: Maintenance soil = 10 grams of carbon black, 10 grams iron oxide, 100 ml WD-40, 100 ml hydraulic oil, and 100 ml gear oil. Soil 2: Production soil = 200 ml Quench Oil and 200 ml cutting oil Chemistries evaluated: BioCircle_L; BioCircle_Ultra; BioCircle_Aero; BioCircle_CB 100; BioCircle_CB 100_ALU; BioCircle_UNO SF; Simple Green; Chem Free SW4; Aquantene 330; LPS T91; Keteca

Results:

Soil_1; Immersion_Stainless Steel				
Cleaners	Initial wt	Final wt	% Removed	% Ave Removed
BioCircle_L				
	0.0987	0.0112	88.65	
	0.092	0.0053	94.24	
	0.0976	0.0052	94.67	92.52
BioCircle_Ultra				
	0.1037	0.0424	59.11	
	0.1061	0.0421	60.32	
	0.0932	0.0339	63.63	61.02
BioCircle_Aero				
	0.1009	0.0128	87.31	
	0.1012	0.0077	92.39	
	0.1109	0.0144	87.02	88.91
BioCircle_CB 100				
	0.1174	0.017	85.52	
	0.1172	0.0345	70.56	
	0.0961	0.0197	79.5	78.53
BioCircle_CB 100_ALU				
	0.1002	0.0416	58.48	
	0.1004	0.0396	60.56	
	0.1151	0.0096	91.66	70.23
BioCircle_UNO SF				

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	0.1145	0.0525	54.15	
	0.1063	0.0429	59.64	
	0.1013	0.0298	70.58	61.46
Simple Green				
	0.0989	0.028	71.69	
	0.0921	0.043	53.31	
	0.1053	0.047	55.37	60.12
Chem Free SW4				
	0.0939	0.0283	69.86	
	0.1011	0.0379	62.51	
	0.1008	0.0263	73.91	68.76
Aquantene 330				
	0.0962	0.0392	37.42	
	0.0919	0.0464	24.37	
	0.1043	0.0419	41.13	34.31
LPS T91				
	0.0911	0.0427	53.13	
	0.0921	0.0465	49.51	
	0.091	0.0208	77.14	59.93
Kreussler				
	0.1042	0.0007	99.33	
	0.0995	0.0045	95.48	
	0.101	0.0019	98.12	97.64
Soil_2; Immersion_Stainless Steel				
Cleaners Initial wt	Final wt	% Removed	% Ave Removed	
BioCircle_L				
	0.0876	0.018	79.45	
	0.0964	0.0103	89.32	
	0.1037	0.0121	88.33	85.7
BioCircle_Ultra				
	0.1043	0.0083	92.04	
	0.1005	0.0038	96.22	
	0.0979	0.007	92.85	93.7
BioCircle_Aero				
	0.0847	0.0056	93.39	
	0.0914	0.0122	86.65	
	0.0868	0.0075	91.36	90.47
BioCircle_CB 100				
	0.0993	0.0033	96.68	
	0.0848	0.0027	96.82	
	0.0808	0.0032	96.04	96.51
BioCircle_CB 100_ALU				
	0.0718	0.0028	96.1	
	0.085	0.0033	96.12	
	0.1041	0.0015	98.56	96.93
BioCircle_UNO SF				
	0.1305	0.0326	75.02	
	0.1021	0.002	98.04	
	0.0864	0.0001	99.88	90.98
Simple Green				
	0.1056	0.0002	99.81	
	0.1056	0.0011	98.96	
	0.0897	0.0001	99.89	99.55
Chem Free SW4				

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	0.0985	0.0004	99.59	
	0.0923	0.0001	99.89	
	0.1003	0.0002	99.8	99.76
Aquantene 330				
	0.0699	0.0006	98.28	
	0.0817	0.003	89.11	
	0.0956	0.0016	97.91	95.1
LPS T91				
	0.1041	0.0002	99.81	
	0.0944	0.0008	99.15	
	0.085	0.0003	99.65	99.54
Kreussler				
	0.0707	0.0003	99.58	
	0.0663	0.0002	99.7	
	0.0893	0.0003	99.66	99.65

Summary:

Substrates:	Stainless Steel
Contaminants:	Oil

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
J Walter Inc.	Bio Circle L	100	84.86	☑	
J Walter Inc.	Bio Circle Ultra	100	63.68	☐	
J Walter Inc.	Bio Circle Aero	100	81.52	☑	
J Walter Inc.	Bio Circle CB 100	100	81.04	☑	
J Walter Inc.	Bio Circle CB 100 ALU	100	71.88	☐	
J Walter Inc.	Bio Circle UNO SF	100	56.38	☐	
Environmental Inteligence	Simple Green Cleaner & Degreaser	100	72.15	☐	
Chem Free Corporation	SW-4 Ozzy Juice Degreasing Solution	100	79.25	☐	
Gray Mills	Aquatene 360	100	64.07	☐	
LPS Laboratories	T-91, Non Solvent degreaser	100	70.97	☐	
Kreussler	Kreussler K 4	100	98.03	☑	
Keteca USA	Water Works Heavy Duty Degreaser	33	70.87	☐	

Conclusion:

An effective cleaner has an efficiency rating of 80% and higher. The most effective cleaning agent at removing GS34 Soil 1 was Kreussler with an efficiency rating of 97.64%. Aquantene 330 was the worse cleaning agent at removing GS34 Soil 1 with an efficiency of 34.31%. In comparison between the Bio Circle cleaning agents, Bio Circle L was the best with an efficiency of 92.52%. In addition to that the worse Bio Circle cleaning agent is between Bio Circle Ultra and Bio Circle UNO SF with a respective rating of 61.02% and 61.46%. Overall, the most effective cleaning agent would be as follows: Kreussler, Bio Circle L and Bio Circle Aero.

The most effective cleaning agent at removing GS34 Soil 2 is Chem Free SW4 with an efficiency of 99.76%. However Kreussler, LPS T91 and Simple Green are nearly on par with the removal efficiency of Chem Free SW4. Their respective relative difference from Chem Free SW4 in efficiency is 0.11%, 0.22% and 0.21%. The worse cleaning agent at removing GS34 Soil 2 is Bio Circle L with a removal efficiency of 85.70%. In comparison between the Bio Circle cleaning agents, Bio Circle CB 100 and Bio Circle CB 100 CLU worked the best. In addition to that Bio Circle L is the worse. Overall the most effective cleaning agent is as follows: Chem Free SW4, Kreussler and Simple Green.
The best cleaning agent at removing GS34 Soil is Kreussler.