CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2016
DateRun:	11/21/2016
Experimenters:	Vanessa Harripersaud
ClientType:	Chemical Company
ProjectNumber:	Project #1
Substrates:	Ceramics, Chrome
PartType:	Coupon
Contaminants:	Films, Soaps
Cleaning Methods:	Manual Wipe
Analytical Methods:	Gravimetric
Purpose:	To evaluate CleanCore Aqueous Ozone solution (ozonated water) (at time = 0, 2 & 4 hrs) and a comparative cleaner on removal efficiency from ceramic and chrome substrates

Experimental Procedure:

Three pre-weighed coupons per cleaner were coated with 1 g of Bathroom soil, at 68°F(room temperature), using a hand held swab. The contaminated coupons were air dried for 24 hours at 68°F (room temperature) and weighed again to determine the amount of soil added after the 24 hour period.

The CleanCore Aqueous Ozone kiosk machine was turned on and run to generate ozonated water. Ozonated water was collected into the CleanCore Spray Bottle.

Properties of tap water and the ozonated water (directly from the spray hose and the CleanCore Spray Bottle) were measured and recorded throughout the procedure, as necessary, including temperature, ORP values (mV), dissolved ozone levels (ppm), and pH.

Instrumentation used for measurements:
on-machine: dissolved ozone meter - ATi Q45H (ozone in ppm and temp in °F); ORP meter - Black Stone BL982411 ORP Controller (ORP in mV)
handheld instruments: Hanna HI 98121 meter (ORP & temp in °C); Chemetrics Meter with vacu-vials (dissolved ozone in ppm)

At the appropriate time interval, based on the age of the ozonated solution in the CleanCore Spray Bottle (t= 0 hr, t=2 hr, t=4 hr), three coupons of each substrate were placed in the SLW unit and a KC Wypal reinforced paper towel was attached to the cleaning sled and treated with one spray of cleaning solution from the CleanCore Spray Bottle. Each coupon was sprayed once with the same cleaning solution. The cleaning unit was run for 20 cycles (equivalent of 30 seconds of cleaning). Coupons were dried overnight and final weights were recorded. Efficiencies were calculated and recorded.

Three coupons of each substrate were also cleaned with a comparative cleaner (Lysol Power Bathroom Cleaner) instead of the ozonated solution, following the same process on the SLW machine and for drying and final weights.

Results:

Ozonated H2O	t=0 hrs	t=2 hrs	t=4 hrs
Temperature	23.7 °C	22.8 °C	19.8 °C
Ozone Levels (in ppm & ORP mV)			
handheld meter (ozonated soln from spray bottle) (ORP)	254 mV	224 mV	223 mV
meter on machine (during filling of spray bottle)	ORP - 930 mV		
meter on machine	1.044 - 1.230 ppm		
vacu-vials (ozonated soln from fill hose)	0.85 ppm		
vacu-vials (ozonated soln from spray bottle)	0.21 ppm	0.05 ppm	0.01ppm
temp of water when made	73.8 °F - 74.0 °F		
pH of water when made	6.5		
tap water - ORP (handheld meter)	205 mV	211 mV	205 mV

CLEANING LABORATORY EVALUATION SUMMARY

tap water - temp (handheld meter)	24.0 °C	22.5 °C	21.0 °C
ozone in tap water (vacu-vials)	0.04 ppm		

Removal

Cleaner	Substrate	Coupon	Clean Wt	Dirty Wt	Final Wt	% Removed	% Average
Ozone t=0 hrs	Ceramic	13	81.2077	81.4510	81.2424	85.74	81.78
		24	82.7321	82.9770	82.7833	79.09	
		7	78.9031	79.1538	78.9520	80.49	
Ozone t = 2hrs		3	80.4009	80.6167	80.4408	81.51	73.16
		24	84.5556	84.8128	84.6362	68.66	
		4	85.9874	86.3007	86.0836	69.29	
Ozone t=4 hrs		12	81.2480	81.4485	81.3438	52.22	53.86
		20	81.6970	81.8790	81.7626	63.96	
		21	75.9327	76.1664	76.0603	45.40	
Lysol Power		16	76.3611	76.5441	76.4258	64.64	62.03
		88	78.4470	78.6981	78.5462	60.49	
		44	77.9398	78.1924	78.0384	60.97	
Ozone t=0 hrs	Chrome	23	21.6569	21.8973	21.7319	68.80	75.64
		24	21.7427	21.9867	21.7921	79.75	
		9	21.6567	21.9027	21.7099	78.37	
Ozone t = 2hrs		16	21.6806	22.0338	21.9261	30.49	44.58
		9	21.6328	22.0473	21.8225	54.23	
		13	21.7088	22.0446	21.8800	49.02	
Ozone t=4 hrs		19	21.6759	22.0332	21.9186	32.07	30.39
		22	27.2304	27.5551	27.4588	29.66	
		18	21.6080	21.8622	21.7874	29.43	
Lysol Power		6	21.6412	21.9569	21.8367	38.07	44.47
		3	21.4829	21.8186	21.6200	59.16	
		14	21.7242	22.0357	21.9230	36.18	

Ceramic Substrate

CompanyName:	Product Name	Conc.	% Efficiency	Effective
			(% Efficiency≥ 80%)	
CleanCore	Aqueous Ozone	100%	T= 0 hrs: 81.78%	Yes, at T= 0 hrs
			T= 2 hrs: 73.16 %	
			T = 4 hrs: 53.86%	
Lysol	Power Bathroom	100%	62.03%	No

Observations (if any: Visual at T=0: ceramic coupons looked appreciably cleaner compared to those cleaned with Lysol Power Bathroom Cleaner

Chrome Substrate				
CompanyName:	Product Name	Conc.	% Efficiency	Effective

CLEANING LABORATORY EVALUATION SUMMARY

			(% Efficiency≥ 80%)	
CleanCore	Aqueous Ozone	100%	T= 0 hrs: 75.64	No
			T= 2 hrs: 44.58	
			T = 4 hrs: 30.39	
Lysol	Power Bathroom	100%	62.03%	No

Observations (if any: Visual at T=0: ceramic coupons looked appreciably cleaner compared to those cleaned with Lysol Power Bathroom Cleaner

Summary:

Substrates:	Ceramics, Chrome				
Contaminants:	Films, Soaps				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
CleanCore	CleanCore queous Ozone Solution	100	78.71	☑	T = 0
Reckitt Benckiser	Lysol Bathroom Cleaner	100	53.25	☐	
CleanCore	CleanCore queous Ozone Solution	100	58.87	☐	T = 2
CleanCore	CleanCore queous Ozone Solution	100	42.12	☐	T = 4

Conclusion:

For ceramic substrate with bathroom soil, the CleanCore Aqueous Ozone Solution had a removal efficiency of 81.78% at T=0, as compared to the 62.03% for the Lysol Power Bathroom Cleaner. For chrome substrate with bathroom soil, the CleanCore Aqueous Ozone Solution had a removal efficiency of 75.64% at T=0, as compared to the 44.7% for the Lysol Power Bathroom Cleaner. Neither cleaner achieved the 80% benchmark.