CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2025
DateRun:	10/06/2025
Experimenters:	Amelia Wagner, Rachael Rososky
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Ceramics, Plastic, Fiberglass, Chrome
PartType:	Coupon
Contaminants:	None
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric, Visual
Purpose:	To test the compatibility of the chemical makeup of the Titan product with the substrates of fiberglass/ polymer, chrome, and ceramic in comparison with a comparable baseline product.

Experimental Procedure:

Basic ASTM F483 Compatibility Testing Procedure:

Three coupons of each substrate were used per cleaner, for a total of 18 coupons. Each coupon was weighed to the nearest 0.1mg and had that initial weight recorded. The coupons were then immersed in their respective cleaner at room temperature for 24 hours. After 24 hours, each coupon was removed from the cleaner and rinsed thoroughly under hot tap water at 120-140F. Following the tap water rinse, each coupon was rinsed with room temperature DI water followed by a room temperature Acetone rinse. The coupons were then allowed to air dry for a few hours. After the coupons had fully air dried, they were visually analyzed as follows-

a. Discoloration and Dulling

b. Etching

c. Presence of accretions and relative amounts

d. Pitting

e. Presence of selective or localized attack

The coupons were then placed back into immersion with their respective cleaners for a subsequent 144 hours. After 144 hours, the coupons were removed and rinsed following the same rinsing steps previously performed. After fully air drying, the coupons were then visually analyzed repeating the same visual categories. Each coupon was weighed to the nearest 0.1 mg, and the weight loss or gain of each coupon was recorded.

Visual Observations Ranking:

Rating	Category Level
1	None
2	Slight
3	Noticeable
4	Considerable
5	Severe

Results:

Visual Observations:

Product	Substrate	AVG Discoloration & Dulling	AVG Etching	AVG Accretions	AVG Pitting	AVG Localized Attacks
Zep Foaming Shower, Tub & Tile Cleaner	Plastic	1	1	1	1	1
	Chrome Coated Aluminum	3	1.5	1	1	1
	Ceramic	1	1	1	1	1
Titan Home Cleaning Solution Bathroom Cleaner (Formulation 1)	Plastic	1	1	1	1	1
	Chrome Coated Aluminum	4.17	1.17	1	1	1
	Ceramic	1	1	1	1	1
Titan, Home Cleaning Solution	Plastic	1	1	1	1	1

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Bathroom Cleaner (Formulation 2)	Chrome Coated Aluminum	1	1	1	1	1
	Ceramic	1	1	1	1	1

Significant discoloration was observed following the first 24 hour testing period on the chrome coupons that were immersed in the Titan Home Cleaning Solution (formulation 1). The discoloration was first observed at the 1 hour mark of immersion. The discoloration increased as immersion continued. This discoloration is described as black spotting. Noticeable dulling was observed following the full 168 hour testing period on the chrome coupons immersed in the Zep Cleaner.

Gravimetric Data:

Product	Substrate	Initial wt.	Final wt.	Δ wt.	AVG Δ wt.
Zep	Plastic	59.1189	59.1280	0.0091	0.02
		59.7690	59.7740	0.0050	
		59.0569	59.0924	0.0355	
	Chrome Plated Aluminum	21.7076	21.6985	-0.0091	-0.01
		21.7435	21.7356	-0.0079	
		21.7345	21.7310	-0.0035	
	Ceramic	54.6306	54.6340	0.0034	0.06
		51.1290	51.2990	0.1700	
		53.4824	53.4845	0.0021	
Titan	Plastic	59.3816	59.4112	0.0296	0.02
		59.6067	59.6163	0.0096	
		58.8219	58.8283	0.0064	
	Chrome Plated Aluminum	21.7101	21.5401	-0.17	-0.18
		21.8774	21.6583	-0.2191	
		21.5281	21.3710	-0.1571	
	Ceramic	52.9555	52.9872	0.0317	0.04
		51.6034	51. 6105	0.0710	
		52.7558	52.7623	0.0065	
	Plastic	59.8843	59.9833	0.099	0.09
		59.8063	59.8784	0.0721	
		59.9525	60.0552	0.1027	
	Chrome Plated Aluminum	21.7076	21.7073	-0.0003	-0.001
		21.7333	21.7321	-0.0012	
		21.7289	21.7284	-0.0005	
	Ceramic	51.9872	52.0036	0.0164	0.07
		52.2001	52.3412	0.1411	
		51.7420	51.7999	0.0579	

Although the chrome coupons immersed in the Zep cleaner show a greater visual ranking of observed etching, based on the gravimetric results it can be seen that the chrome coupons immersed in the Titan Cleaning Solution experienced greater etching based on a greater loss of weight over the course of the testing period. It is likely that the etching was not as visually noticeable on these coupons due to the dark black discoloration. The etching of the Titan Cleaning Solution (formulation 1) would not have begun until the 1 hour mark at which the discoloration was first noticed.

Summary:

Conclusion:

All cleaners are highly compatible with plastic and ceramic. Both the Zep Foaming Shower, Tub and Tile Cleaner and the Titan Home Cleaning Solution (formulation 1) caused some level of damage to chrome coupons, with this damage being more significant for the Titan Home Cleaning Solution Bathroom Cleaner (formulation 1) compared to the Zep Foaming Shower, Tub and Tile Cleaner however, the discoloration was not noticed until the 1 hour mark of testing. As the use of this product would not require more than 3-5 minutes of contact time, this should not pose an issue. The Titan Home Solutions (formulation 2) was completely compatible with all substrates.