CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2019
DateRun:	08/14/2019
Experimenters:	Sabrina Apel, Othon Pagounes
ClientType:	Medical Instrument Mfr
ProjectNumber:	Project #1
Substrates:	Titanium
PartType:	Coupon
Contaminants:	Oil
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric, Visual
Purpose:	To evaluate the effectiveness of solvent and aqueous based cleaners at the removal of J2 on titanium substrates.
Experimental Procedure:	Six sets of three pre-weighed clean titanium coupons were contaminated on the bottom 1/3 of the coupon with J2 oil using a cotton swab. Cleaners were heated to vendor recommended temperatures, and coupons were immersed three at a time into a beaker for 15 minutes. Visual observations were recorded every five minutes, and final weights were recorded after cleaning.

Results:

Table 1: Gravimetric Results

Cleaner	Conc. (%)	Temperature (°F)	Initial wt. of cont. (g)	Final wt. of cont. (g)	%Cont. Removed (g)	% Average Removal
Dowanol PnBGE	100	100	0.2660	0.0006	99.77	99.75
			0.2716	0.0005	99.82	
			0.2971	0.0010	99.66	
Metalnox 6386	100	110	0.4257	0.0046	98.92	98.64
			0.3608	0.0031	99.14	
			0.3755	0.0080	97.87	
Dimethyl glutarate	100	129	0.4796	0.0066	98.62	98.41
			0.2905	0.0046	98.42	
			0.2362	0.0043	98.18	
Liquinox	1	171	0.5055	0.0221	95.63	95.32
			0.4376	0.0165	96.23	
			0.3164	0.0187	94.09	
OzzyJuice 3	100	106	0.3677	0.1465	60.16	55.10
			0.3562	0.1643	53.87	
			0.3015	0.1469	51.28	
SC Aircraft & Metal Cleaner	1	100	0.6532	0.1620	75.20	62.42
			0.6221	0.2218	64.35	
			0.4637	0.2424	47.72	

Table 2: Visual Observations

Cleaner	5 Minutes	10 Minutes	15 Minutes
Dowanol PnBGE	-cleaner is clear -soil is highly viscous -soil line is not visible -no change in substrate	-no change in cleaner -soil line is not visible -no change in substrate	-no change in cleaner -soil line is not visible -substrate is mainly wet -blue plastic on back of substrate is peeling off

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Metalnox 6386	-cleaner is clear -soil is highly viscous - soil line is not visible -no change In substrate	-no change in cleaner -soil line is not visible -no change in substrate	-no change in cleaner -soil line is not visible -substrate is mainly wet -blue plastic on back of substrate is peeling off
Dimethyl glutarate	-cleaner is clear -soil is highly viscous -soil line is not visible -no change in substrate	-no change in cleaner -soil line is not visible -no change in substrate	-no change in cleaner -soil line is not visible -substrate is mainly wet -blue plastic on back of substrate is peeling off
Liquinox	-cleaner is clear with bubbles -soil is highly viscous -soil line is not visible -soil sunk to bottom of beaker and formed clumps	-no change in cleaner -no change in substrate -soil line is not visible	-no change in cleaner -substrate is partly dry with some clumped soil towards the bottom of the substrate's surface -blue plastic on back of substrate is peeling off
Ozzy Juice 3	-cleaner has a slight brownish color -soil is highly viscous -some soil is visually coming off -no change in substrate	-cleaner became slightly cloudy -soil formed clumps and submerged to the bottom of the beaker -soil line is moving towards the bottom of the substrate	-cleaner became cloudy -some soil submerged to the bottom of the beaker -substrate is mainly wet -blue plastic on back of substrate is peeling off
SC Aircraft & Metal Cleaner	-cleaner has a slight yellow color with bubbles -soil line is visible -no change in substrate	-some soil submerged to bottom of the beaker -soil line is visible -no change in substrate -no change in cleaner	-some soil submerged to the bottom of the beaker -soil line moved towards the bottom of the substrate -substrate is slightly wet -blue plastic on back of substrate is peeling off

Summary:

Substrates:	Titanium
Contaminants:	Oil

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Dow Chemical Company	Dowanol PnBGE	100%	99.75	☑	
Kyzen Corporation	Metalnox M6386	100%	98.64	☑	
Fisher Scientific	Dimethyl glutarate (CAS: 1119-40-0)	100%	98.41	☑	
Alconox Inc	Liquinox	1%	95.32	☑	
Chem Free Corporation	SW-3 Ozzy Juice (Improved Low Odor)	100%	55.10	☐	
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	1%	62.42	☐	Future tests to increase concentration 2-5%

Conclusion: Dowanol PnBGE, Metalnox 6386, Dimethyl glutarate, and Liquinox were the most effective at removing J2 soil from titanium substrates using heated immersion.