

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004  
 DateRun: 02/09/2004  
 Experimenters: Jason Marshall  
 ClientType: Manufacturer of Ceramic Capacitors  
 ProjectNumber: Project #1  
 Substrates: Ceramics  
 PartType: Coupon  
 Contaminants: Waxes  
 Cleaning Methods: Immersion/Soak  
 Analytical Methods: Gravimetric  
 Purpose: To evaluate alternatives to TCE for wax removal

**Experimental Procedure:** Eight cleaners were selected from the laboratories database of past testing based on supplied data from client. Four aqueous based cleaners were diluted to 10% using DI water in 600 ml beakers. Three semi-aqueous products were used at full strength also in 600 ml beakers. A fourth semi-aqueous product was diluted to 20% as recommended by the vendor. A ninth product was added as the client's current cleaner. Six of the nine products were heated to 130 F on a hot plate.

Twenty-seven preweighed ceramic coupons were coated with client supplied wax, Zopher Mills Inc No 1563 Wax (mixture of waxes and resins). The wax was first melted using a Master Appliance heat gun in a beaker and applied directly to the coupon surface. The coupons were allowed to cool to room temperature before weighing a second time. Three coupons were cleaned in each solution for 30 minutes using stir-bar agitation. Coupons were rinsed in tap water for 15 seconds at 120 F, followed by air blow off at room temperature. Once dry, coupons were weighed a final time and efficiencies for each cleaner were calculated.

**Results:** Only one product, Uni Clear, was capable of removing a majority of the wax from the ceramic coupons. The table lists the amount of soil added, removed and percent efficiency for each coupon.

Cleaner	Initial wt	Final wt	% Removed
Bio T V 50	0.3038	0.3040	-0.07
	0.3118	0.3166	-1.54
	0.5682	0.5694	-0.21
Citrus Bust 7	0.4880	0.4505	7.68
	0.4585	0.4144	9.62
	0.3884	0.3475	10.53
Uni Clear	0.2603	0.0841	67.69
	0.3940	0.1561	60.38
	0.6682	0.0692	89.64
Ionox HC 2	0.4853	0.4816	0.76
	0.4377	0.4326	1.17
	0.2556	0.2456	3.91
Aquavantage 1400	0.3331	0.3359	-0.84
	0.2299	0.2341	-1.83
	0.3766	0.3788	-0.58
SC Aircraft	0.2978	0.3000	-0.74
	0.3640	0.3655	-0.41
	0.2136	0.2170	-1.59
Inproclean 3800	0.4532	0.4546	-0.31
	0.3022	0.302	0.07
	0.4336	0.4335	0.02
Polyspray Jet 790 XS	0.5337	0.5307	0.56
	0.3631	0.3592	1.07
	0.3574	0.3567	0.20
Liquinox	0.3141	0.3171	-0.96
	0.3899	0.3913	-0.36

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	0.3985	0.4003	-0.45
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Summary:

<b>Substrates:</b>	Ceramics				
<b>Contaminants:</b>	Waxes				
<b>Company Name:</b>	<b>Product Name:</b>	<b>Conc.:</b>	<b>Efficiency:</b>	<b>Effective:</b>	<b>Observations:</b>
Bio Chem Systems	Bio T V 50	20	-0.61	<input type="checkbox"/>	
Florida Chemical Company	Citrus Burst 7	100	9.28	<input type="checkbox"/>	
Universal Photonics	Uni Clear	100	72.57	<input checked="" type="checkbox"/>	
Kyzen Corporation	Ionox HC 2	100	1.95	<input type="checkbox"/>	
Brulin Corporation	Aquavantage 1400	10	-1.08	<input type="checkbox"/>	
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	10	-0.91	<input type="checkbox"/>	
Oakite Products	Inproclean 3800	10	-0.07	<input type="checkbox"/>	
US Polychem Corporation	Polyspray Jet 790 XS	10	0.61	<input type="checkbox"/>	
Alconox Inc	Liquinox	10	-0.59	<input type="checkbox"/>	

Conclusion:

Uni Clear, a d-limonene based product, was the only alternative that removed most of the wax during the 30 minute immersion cleaning. The next trial will look to evaluate more products on the wax removal.