CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	1995
DateRun:	07/31/1995
Experimenters:	Donald Garlotta, Jay Jankauskas
ClientType:	Electro-Optical Devices
ProjectNumber:	Project #1
Substrates:	Glass/Quartz
PartType:	Coupon
Contaminants:	Waxes
Cleaning Methods:	Ultrasonics
Analytical Methods:	Gravimetric, Visual, Waterbreak
Purpose:	Determine the effectiveness of ultrasonics

Experimental Procedure:

Cleaning was done in beaker ultrasonics set at 150 F. Cleaning time will be determined during the trial depending on the cleaner's effectiveness. Two glass samples will be used for each cleaner. The samples will be rinsed in a tap water bath for 1 minute at 150 F and then in a DI water rinse for 1 minute at room temperature. The parts will then be dried under an air knife for 1 minute and then in a convection oven set at 120 F for 30 minutes.
The samples will be analyzed gravimetrically to get a percent removal. The samples will be observed with a water-break test to detect any residual wax. After drying, the samples will be checked for any water spotting that may occur.
Trial #1-
SAMPLE NUMBERS: #1, #2
CLEANING PRODUCT: Alconox Alcojet Detergent
CONCENTRATION: 2% solution (20 grams per liter solution)

Trial #2-
SAMPLE NUMBERS: #3, #4
CLEANING PRODUCT: International Products Micro
CONCENTRATION: 4% by volume

Trial #3-
SAMPLE NUMBERS: #5, #6
CLEANING PRODUCT: Oakite Inproclean #3800
CONCENTRATION: 10% by volume

Trial #4-
SAMPLE NUMBERS: #7, #8
CLEANING PRODUCT: Innovative Organics L-12 cleaner
CONCENTRATION: 10% by volume

Results:

After cooling down, all the cleaners were ranked in three categories: Wax Removal, Wax Separation and Spotting. A number of one to four was assigned for each cleaner's performance, one being the best performer and four being the worst.

	Percent Removal	Wax Separation	Spotting
Alcojet	1	2	1
Micro	3	1	3
Inproclean #3800	2	2	1
L-12	4	4	4

The Innovative Organics L-12 cleaner also had the problem of redeposition during the trial. The wax would be removed and float up on the surface, after a while, the glob of wax would sink in the solution and cling to the glass surface again.

GRAVIMETRIC ANALYSIS

sample #	clean mass (g)	mass with contamination (g)	mass after cleaning (g)	contaminant removed (g)	Percent Removal
1	14.8772	17.5155	14.8765	2.639	100.03%
2	16.5516	19.2710	16.5513	2.7197	100.01%
3	**12.3678**	**14.6132**	**12.3680**	**2.2452**	**99.99%**
4	**14.3587**	**16.9307**	**14.3591**	**2.5716**	**99.98%**

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5	15.0665	18.0461	15.0665	2.9796	100.00%
6	13.3553	16.2423	13.3550	2.8873	100.01%
7	*14.0972*	*17.3542*	*14.2524*	*3.1018*	*5.23%*
8	*15.7449*	*19.4233*	*15.8566*	*3.5667*	*96.96%*

1,2 - Alconox Alcojet
3,4 - International Products Group Micro
5,6 - Oakite Inproclean #3800
7,8 - Innovative Organics L-12

Summary:

Substrates:	Glass/Quartz
Contaminants:	Waxes

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Alconox Inc	Alcojet	2	0.00	☑	
International Products Corporation	Micro (no longer available)	4	0.00	☐	
Oakite Products	Inproclean 3800	10	0.00	☑	
Innovative Organics Inc	Amberclean L 12	10	0.00	☐	

Conclusion:

Immersion: The stir-bar agitation appeared to provide sufficient energy for cleaning. The Alcojet and the Oakite Inproclean #3800 were both very successful in cleaning the glass samples. Brushing should also be considered to ensure cleanliness (International Products Micro cleaner was successful when brushing was applied).

Ultrasonics: The ultrasonics was successful for all cleaners except the Innovative Organics L-12 cleaner. Results suggest that a lower cleaning temperature can be used as opposed to agitated immersion. The ultrasonics also provided a better separation of wax from the cleaner solution.

Rinsing: The rinsing procedures used were successful in removing residual cleaner from the glass and leaving a spot free surface after drying. A final rinse of cold running DI water may be appropriate (some residual cleaning solution was noticed on the samples when rinsed in a still bath of DI water).