

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004  
 DateRun: 02/11/2004  
 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 more alternatives for wax removal

**Experimental Procedure:** Seven cleaners were selected from the laboratories database of past testing based on supplied data from client. All products were used at full strength also in 250 ml beakers. All products were also used at room temperature. Twenty-one 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:** Three products removed over half of the wax within the 30 minutes. Of these the Citrus Pure removed over 85% of the wax. The table below lists the amount of wax added and the amount remaining after cleaning.

| Cleaner             | Initial wt | Final wt | % Removed |
|---------------------|------------|----------|-----------|
| Bio T 300 B         | 0.3040     | 0.0494   | 83.75     |
|                     | 0.3166     | 0.0828   | 73.85     |
|                     | 0.5694     | 0.2018   | 64.56     |
| D-Limonene          | 0.4505     | 0.2704   | 39.98     |
|                     | 0.4144     | 0.1521   | 63.30     |
|                     | 0.3475     | 0.1142   | 67.14     |
| SC Supersolve       | 0.4816     | 0.4814   | 0.04      |
|                     | 0.4326     | 0.4273   | 1.23      |
|                     | 0.2456     | 0.2427   | 1.18      |
| 3-D Degreaser       | 0.3359     | 0.3305   | 1.61      |
|                     | 0.2341     | 0.2039   | 12.90     |
|                     | 0.3788     | 0.3736   | 1.37      |
| Citrus-Pure Remover | 0.3000     | 0.0241   | 91.97     |
|                     | 0.3655     | 0.0991   | 72.89     |
|                     | 0.2170     | 0.0181   | 91.66     |
| SoySolv II          | 0.4546     | 0.4211   | 7.37      |
|                     | 0.3020     | 0.2797   | 7.38      |
|                     | 0.4335     | 0.4047   | 6.64      |
| DBD 6               | 0.5307     | 0.5213   | 1.77      |
|                     | 0.3592     | 0.3546   | 1.28      |
|                     | 0.3567     | 0.3375   | 5.38      |

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 300 B          | 100           | 74.05              | <input checked="" type="checkbox"/> |                      |
| Florida Chemical Company | D-Limonene           | 100           | 56.80              | <input checked="" type="checkbox"/> |                      |

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|                             |                              |     |       |                                     |  |
|-----------------------------|------------------------------|-----|-------|-------------------------------------|--|
| Gemtek Products             | SC Supersolve Safety Solvent | 100 | 0.82  | <input type="checkbox"/>            |  |
| Finger Lakes Chemical       | 3 D Degreaser                | 100 | 5.29  | <input type="checkbox"/>            |  |
| Abatement Technologies      | Citrus Pure AS850            | 100 | 85.50 | <input checked="" type="checkbox"/> |  |
| Soysolv Industrial Products | Soysolv II solvent           | 100 | 7.13  | <input type="checkbox"/>            |  |
| Invista S.a.r.l             | Flexisolv DBE 6 ester        | 100 | 2.81  | <input type="checkbox"/>            |  |

**Conclusion:**

The successful products from both trials may be more effective at a higher temperature, however some of these products have a flash point below 140 F. Ultrasonics may also improve the removal of the wax.