# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1997

DateRun: 07/24/1997

Experimenters: Jason Marshall, Prashant Trivedi

ClientType: Biomedical Device Manufacturer

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Resins/Rosins, Plastic

Cleaning Methods: Ultrasonics

Analytical Methods: Gravimetric

Purpose: Evaluating cleaning of second contaminant

Experimental Procedure: Seventeen (17) stainless steel coupons were weighed after the preclean treatment. The coupons were then contaminated with two types of plastics using the university's plastic department equipment.

Four cleaning chemistries were chosen on the basis of their success from the previous trial and two were selected for their possible ability to remove plastics. The chemistries chosen were made into 10% solutions based on volume. The solutions were then heated in beakers to approximately 120 F in the 48 KHz ultrasonic tank. Three coupons were placed into each solution (only two for Citra Safe) for a period of 10 minutes. Upon completion of the cleaning time, the coupons were rinsed with tap water in beakers with stir-bar agitation at 120 F for two minutes followed by drying with a hot air gun at 115 F also for two minutes. The coupons were then allowed to cool for about an hour and then the cleaned weight was recorded.
SUBSTRATE MATERIAL: Stainless Steel
CONTAMINANTS: Plastics (SU 1104 001, SA 106 0052)

Results:

| %Contaminant Removed | | | | | | |
|---|---|---|---|---|---|---|
| | 2000XS | Sea Wash | Daraclean | Inproclean | Methyl E. | Citra Safe |
| | 0.08 | 0.42 | 0.08 | 1.02 | -13.1 | |
| | 0.11 | 0.25 | 0.54 | 0.33 | -7.94 | -0.01 |
| | 0.23 | 0.58 | 0.92 | 0.08 | -6.22 | -0.01 |
| Average | 0.14 | 0.42 | 0.51 | 0.47 | -9.09 | -0.06 |
| Std Dev | 0.08 | 0.16 | 0.42 | 0.49 | 3.58 | 0.00 |

Even though none of the chemistries performed well, the lack of cleaning efficiency does not rule out use of the chemistries. The situation that was created for the trial was a gross exaggeration of reality. The parts that need to be cleaned do not have large amounts of plastics on them due to the pretreatment in the 800oF oven. The melting points of the plastics are well below the oven temperature which would result in removal of most of the plastics.
The two chemistries that resulted in a net gain in weight will not be used in any further experiments for Bard.

Of the remaining chemistries, the two best cleaners were Inproclean and Daraclean. It should also be noted that these two chemistries were inconsistent in the cleaning rates. Sea Wash cleaned slightly less than Inproclean and Daraclean, yet Sea Wash was more consistent. 2000XS showed consistent but little cleaning capabilities toward the plastic contaminates.

Summary:

| **Substrates:** | Stainless Steel | | | | |
|---|---|---|---|---|---|
| **Contaminants:** | Resins/Rosins, Plastic | | | | |
| **Company Name:** | **Product Name:** | **Conc.:** | **Efficiency:** | **Effective:** | **Observations:** |
| US Polychem Corporation | Polychem A 2000 XS | 10 | 0.14 | ☐ | |
| Warren Chemical Company | Sea Wash Neutral | 10 | 0.42 | ☐ | |
| Magnaflux | Daraclean 282 | 10 | 0.51 | ☐ | |
| Oakite Products | Inproclean 3800 | 10 | 0.47 | ☐ | |
| Twin Rivers Technologies | Methyl Ester 1618 | 10 | -9.09 | ☐ | |
| Inland Technologies Inc | Citrasafe | 10 | -0.01 | ☐ | |

Conclusion: None of the selected chemistries proved to be very successful at removing the plastics from the coupons. The lack of cleaning ability does not eliminate the chemistries for use. This deficiency only emphasizes the need to remove the majority of the plastic contamination through other means. In the case of C.R.

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Bard, the alternative method would be the use of their 800 F oven. The oven's temperature far exceeds any of the melting points of the plastics used at Bard.

The next step will be to perform cleaning on the parts obtained from Bard using the best two chemistries. Upon completion of cleaning, the parts will be sent back to Bard for inspection.