CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1999

DateRun: 09/28/1999

Experimenters: Jason Marshall

ClientType: Consultant

ProjectNumber: Project #1

Substrates: Liquid

PartType: Coupon

Contaminants: Alcohol

Cleaning Methods:

Analytical Methods: Colorimeter

Purpose: To measure contamination levels of cleaning solution over five days of use.

Experimental Procedure: A 2% solution was made of Micro 90 using DI water in 400 mL beaker. Three concentrations of the contaminant, based on volume percent (5, 10 and 15), were added to separate 80 mL beakers and containing the cleaner. Using LaMotte's Smart Colorimeter to evaluate the standards using the chlorine test. The general test procedure was first to zero the instrument using 0% standard (2% Micro 90). The other standards were measured and values were recorded. The vial was rinsed in between each standard in order to ensure accurate readings. Once the standards were measured, the five unknown samples were analyzed. Using the recorded values, the data was plotted and analyzed using statistical methods available in Microsoft Excel.

Unknown concentrations were calculated from the new standards made and from the old correlation determined in a previous trial. This was done to determine if standards had to be made up every time or if one correlation could be used instead.

SUBSTRATE MATERIAL: Liquid-Dirty Cleaning Solution
CONTAMINANTS: DuPont Evanol Concentrated (Vinyl Alcohol Polymers & Copolymers CAS#s: 9002-89-5, 25213-24-5, 54626-91-4; Methanol Bulk/Packaged CAS #: 67-56-1; Sodium Acetate CAS#: 127-09-3)

Results: The first portion of the experiment was to determine a formula which could be used to calculate the concentrations of the unknown samples. Table 1 list the standard concentrations, the readings recorded and calculated data using new and old correlations.

Table 1. Finding Correlation

	Baseline	Calculated	y=mx+b
Standard	Reading	new	old
0	0	-0.001	0.005
5	0.03	0.033	0.04
10	0.07	0.067	0.075
15	0.1	0.101	0.11
50	0.339	0.355	

Using the two formulas, the unknown concentrations were determined after rearranging the formulas to solve for the concentrations. Table 2 lists the sample date, the recorded chlorine concentrations and the two calculated contaminant concentrations. These values could also be obtained graphically as shown in Figure 1.

Table 2. Calculated Values

Concentration	From new data	From old Data	
Sample	Unknown	x = (y-b)/m	
9\20	0.03	4.559	3.571
9\21	0.1	14.853	13.571
9\22	0.07	10.441	9.286
9\23	0.25	36.912	35.000
9\24	0.28	41.324	39.286

In the figure, the circle areas encompass the concentrations of the unknown contaminant levels determined from the chlorine levels. As can be seen both from Figure 1 and Table 2, the two values obtained are relatively the same.

Summary:

Conclusion: The concentrations of the contaminated samples were determined using the colorimeter when set to on the chlorine test. The calculated values can be obtained in two ways. The first method involves using

statistical methods available in Microsoft Excel to determine the slope and y-intercept. Rearrange the y = mx + b to solve for x, and enter the chlorine levels into the formula as the y values. The concentration of the contaminant in the supplied samples is then determined. The other method involves graphing the standards and the corresponding chlorine concentrations. From the graph, the unknown contaminant concentrations are determined by finding the chlorine concentrations of the supplied samples and finding the intercept on the calculated standards-line. The standards correlation line can either be found each time an unknown sample needs to be measured, or the correlation from a previous day can be used.