# CLEANING LABORATORY EVALUATION SUMMARY

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| SCL #: | 2006 |
| DateRun: | 09/15/2006 |
| Experimenters: | Jason Marshall |
| ClientType: | Chemical Company |
| ProjectNumber: | Project #2 |
| Substrates: | Gold |
| PartType: | Part |
| Contaminants: | Metal fines |
| Cleaning Methods: | Immersion/Soak |
| Analytical Methods: | Gravimetric |
| Purpose: | To evaluate etching solution on electronics solids waste stream. |
| Experimental Procedure: | Etching the Copper-Gold Mix<br>An initial volume of 200 ml of AU-1 Gold Etchant bottle was emptied into a 250 ml beaker and heated to 130 F in water bath. *Heating the solution further, maximum 180 F, will increase the rate of etching.<br>The copper-gold mix was weighed using a Denver Instruments A-250 balance (0.0001g). The mix was emptied into the etchant solution and a stirred with a glass rod. Observations were made during the etchant process. The etchant process was allowed to progress for 30 minutes. After the initial stirring, a magnetic stir bar as used to mix the solution. At the end of etching any remaining solids were filtered and collected to be weighed after drying.<br><br>REMOVING THE GOLD<br>The GoldOut™ was slowly added (~0.5 grams) to the etchant solution while stirring with a clean glass rod. The process should be considered complete when the initial dark red color of the solution turned to a pale yellow color.<br>The precipitate containing the gold was expected to settle-out in approximately five minutes and was then removed from solution by filtration. A glass fiber filter was used to collect the precipitated gold.<br><br>All filters were dried at 200 F for hour and then allowed to air dry at ambient temperatures for 30 hours. The filters were then weighed again to determine the amount of material collected. |
| Results: | After five minutes of mixing the copper-gold mix into the gold etchant solution, it was noted that there was a lot of solids at the bottom of the beaker. There was a silver colored solid and a gold colored solid. In an attempt to determine if the etchant solution was saturated an additional 800 mls of etchant was added. During the mixing, the initial purple color of the etchant solution turned to a brown (apple cider color). Before the GoldOut was added the solution was filtered to remove the initial solids that settled out.<br><br>Upon collection of the solid, it was noted that the material was white in color. The dried solids and filter were weighed again. After sitting overnight, the collected solids turned from white to a dark brown-copper color. In addition, the filter turned green underneath the solids. The weight for the solids collected was greater than the initial weight of the copper feed, therefore the solids were placed back into the oven at 200F to remove any residual moisture that might still remain.<br><br>Additional observations revealed that the pre GoldOut solution had metal in it that was attracted to a magnetic stir-bar and wand.<br><br>After 30 minutes of mixing with the GoldOut added, the solution was filtered through a glass fiber filter. The collected solids on the filter were dried for one hour at 200 F in an oven and then allowed to sit for 30 hours at ambient conditions. The solids collected after the addition of the GoldOut were gold-tan in color and looked like a paste. The filter was dried in an oven for one hour at 200F and then air dried for 30 hours.<br><br>The collected solution also was allowed to sit for 30 hours. During this time, yellow-tan solids had settled out of solution. The solution and "new" solids were filtered again and dried in an oven at 200F. The paste that was collected was the same color as what was collected from the post GoldOut filtering.<br><br>Weight of Electronic-Copper<br>25.9584 g<br><br>Weight of pre GoldOut collected solids<br>Initial 34.6984 g<br>Add 1 hour 29.5660 g<br>Add 2 hour 29.5686 g |
| Summary: | |
| Conclusion: | The success of the GoldOut in separating gold from the electronic copper feed could not be readily determined from the gravimetric analysis. The collected solids would need to be analyzed to determine what was collected at the various stages of the procedure. |