



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

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| Name(s) So-Ky R. Loren | Project Number S0514 |
| Project Title Electroplating | |
| Abstract Objectives/Goals The problem I tried to solve was what would cause more mass of cobalt metal to precipitate out of a cobalt nitrate solution, a greater amount of voltage or a higher concentration of solution. Methods/Materials I went about my project by setting up two electrodes in a cobalt nitrate solution. I made a 1, 2, and 3% solution. I would dissolve the cobalt nitrate and then place electrodes into the solution and connect each end to a wire which lead to either a positive or negative side of a battery. I tested 3, 6, and 9-Volt batteries with each concentration. When the electrodes were connected to the battery I would start a timer and wait for 5 minutes. During the five minutes I would then observe what happened, and at the end I would disconnect an electrode to stop the reaction. I would then measure the mass of grams separated by scraping off the cobalt on the electrode and using a filter to collect any flakes in the solution. I would then repeat the process for a total of 3 trials. Results At a 1% concentration I recorded an average of .02 grams separated at 3-V, .30 grams at 6-V, and .35 grams at 9-V. At a 2% concentration I recorded an average of .08 grams separated at 3-V, .3 grams at 6-V, and .53 grams at 9-V. At a 3% concentration I recorded .29 grams separated at 3-V, .6 grams at 6-V, and .75 grams at 9-V. Conclusions/Discussion My research told me that when you increase the voltage of a single concentration there will be a greater amount of cobalt separated than if you increase the concentration at a certain voltage. The differences between my trials showed that a low voltage in any concentration caused the metal to become a durable coating, while a high voltage in any concentration caused the cobalt metal to float around in the solution. This shows that low voltages are better at plating objects, while high voltages are better for separating a metal from an ore in order to gather it. | |
| Summary Statement I wanted to know if a higher voltage or greater concentration would be better for separating more cobalt. | |
| Help Received My Science Teacher helped me make graphs, my English Teacher checked my work for grammatical errors, all my materials came from the school's science room, and I used a friend's mat cutter. | |