CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
S0707

Project Title
Galvanic Cells: The Limiting Factor in Recharging

Abstract

Objectives/Goals
Given the observation that galvanic cells tend to stop recharging over time, my hypothesis was that galvanic cells stop recharging over time due to deterioration of their electrodes.

Methods/Materials
Materials included a PC Interface board, recharging module board, controlling board (all constructed by me), ferric chloride solution, aluminum chloride solution, beakers, agar, and a U-shaped glass tube.
Methods: 1. A microcontroller-based recharger and data sampler with a computer interface for data recording and control of the experiment, was designed and constructed by me.
2. 1M solutions of each ferric chloride and aluminum chloride were placed in separate beakers.
3. 1M salt and agar was melted in the U shaped glass tube to connect the two solutions.
4. The electrodes were immersed in their respective solutions attached to the recharging unit.
5. Charging and recharging of the galvanic cell was controlled using a microcontroller based circuit of my design and construction.

Results
The constructed Aluminum/Iron galvanic cell eventually stopped recharging due to deterioration of the electrodes through oxidation.

Conclusions/Discussion
Galvanic cells eventually stop recahrging due to oxidation of their metal electrodes. The data recorder and controller I constructed worked well to control the experiment and collected the data needed.

Summary Statement
This project focuses on the use of microcontroller-based circuitry of my design and construction for the observation and manipulation of galvanic cell charge and discharge properties.

Help Received
Mr. Ferrazi, my science teacher, provided the glass U-tube and chemicals. I assembled all the electronics myself.