CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

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Project Number

34517

Project Title

The Effect of Different Levels of Caffeine on the Production of Electricity from a Microbial Battery

Abstract

Objectives/Goals

The objective of this experiment was to determine if caffeine would have an effect on the electricity flow from a microbial battery. I hypothesized that caffeine would increase the electricity flow from a microbial battery.

Methods/Materials

A microbial battery was built using two plastic cups, a 19cm boba straw, and aluminum foil for the electrodes. Coffee filter was placed into the boba straw and a 200g sample into the anode and 200ml of 1M NaCl in the cathode. One battery was set up with 0g caffeine, one 0.3g, one 0.6g, one 0.9g, and one 1.2g of caffeine for 40+ hours. The Arduino-based microcontroller automated the data collection of the voltage readings.

Results

The control group showed a relatively steady average voltage output from the microbial cell. The group with 0.3g of caffeine showed a change of 0.0089 mV per second, a change of 0.0086mV. The group with 0.6g of caffeine showed a drastic change of 0.0188mV from control. The group with 0.9g of caffeine showed a steady average output of electricity production. The group with 1.2g of caffeine actually showed a slight decrease in the voltage output.

Conclusions/Discussion

Thus my hypothesis was supported by the data. The increase in caffeine did cause an eventual increase in the voltage production, particularly when 0.6g of caffeine was added to the microbial battery. Anything higher, the average voltage change decreases. Microbes at higher caffeine concentrations are toxic to the effects of caffeine.

Summary Statement

My project measures the effects of caffeine on electricity production from a microbial battery

Help Received

Mrs. De La Cruz provided access to laboratory equipment. My father supported me financially. My mother and sister helped with the creation of the board. My grandmother helped with providing expertise for the best soil located in the backyard.