CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
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Project Number
J0205

Project Title
Microbial Fuel Cells: Generating Electricity from Organic Matter

Abstract

Objectives/Goals
A microbial fuel cell is a renewable means of generating electricity using anaerobic bacteria that decompose organic matter. The goal of my project is to find out how the pH of the electrolyte in the cathode chamber of the microbial fuel cell would affect the voltage generated. I hypothesized that an acidic solution would produce the most electrical power. There are more H+ ions then there are electrons, so the bonding reaction occurs quickly, thus more power is generated.

Methods/Materials
Materials:
Medium sized jar (plastic or glass) with removable lid ; Carbon Brushes ; RVC (Anode); Carbon Cloth with Pt catalyst (Cathode); Aquarium Water Pump with tube; Hookup Copper Wire;Multi-meter; Resistors; 1x1x1 PVC Schedule 40 Tee; 1" PVC Schedule 40 connector; 3/4" x1" PVC Reducing Female Adaptor; 3/4"x1" PVC Reducing Male Adaptor; PVC Schedule 40 Threaded cap; Mud from creek bearing microbial bacteria; Agar Powder; Vinegar; Baking Soda ;Saline Water Solution
Procedure: Assemble Salt bridge; Anode & cathode chambers; Electrodes; MFC Unit
Measurement of Voltage & Data Collection (vary pH of electrolyte)

Results
The acidic and alkaline solutions produced erratic results with negative property. However, saltwater, with a neutral pH was an optimum electrolyte as it produced consistently positive voltage with a predictable pattern.

Conclusions/Discussion
My hypothesis was incorrect. More trials could verify the erratic behavior of the alkaline and acidic electrolytes. Also, measuring the pH of the electrolyte before, during, and after the experiment would give a better understanding of the relationship between the pH and the energy generated. With the data I have, it clearly seems that water is the optimum and best electrolyte.

Summary Statement
My project is about generating electricity using anaerobic bacteria inside organic matter, and I altered the pH of the electrolyte in the cathode chamber to see that would affect the voltage generated by the microbial fuel cell.

Help Received
My Parents helped me build the microbial fuel cell