CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Semaj A. Davis

Project Number

J0203

Project Title

Waste Not, Want Not: Use the Microbial Fuel Cell to Create Electricity from Waste

Abstract

Objectives/Goals

My objective was to find an alternative method for creating electricity, the (MFC) which is a system in which bacteria converts organic material into power. The goal was to build a (MFC)using a benthic mud sample from a stream and determine if this device can harvest the electrons that the anaerobic bacteria create.

Methods/Materials

In this project I had 4 main parts the anode, cathode, proton-exchange membrane, and external circuit. For the anode and cathode I used two medium sized acrylic containers as a basin for the salt water solution and anaerobic mud. For the proton-exchange membrane I used a compression fitting as the tube that inserts between the anode and cathode. Then inside of it I had boiled water with salt and unflavored gelatin in as a way for the protons to pass through from the anaerobic mud to the salt water solution. Next, I used carbon cloth and insulated copper wire as my electrical circuits so that the voltage can pass through them so that I can read them through the digital multi-meter. For the actual benthic mud; I obtained it from a lower order stream and for the salt water solution I obtained river water and put salt into it so it can become a conductive solution so electrons can pass through it. Lastly, I used an aquarium air pump to oxidize the salt water solution and a digital multi-meter to measure the voltage.

Results

For my results I did 2 tests, one with the aquarium pump on and one without it to see if the oxidation was necessary. So with the oxidation process going through the chamber the voltage read .011,.020,.016,.023,.033,.030,.050,.057 and with these readings the voltage would fluctuate at certain times and decrease mainly in the beginning due to it needing to run longer but over a certain period of time it would stop at around a stand still of about .057. Next, when I tested it without the oxygen all the voltage readings went below zero due to the fact that the (MFC) needed that oxygen to produce voltage.

Conclusions/Discussion

All in all, I created this project as a way to benefit the world because I enjoy creating something that can make the planet a better place and not a bad one. Furthermore, I can actually power something like a small fan or battery but the problem is being that the mud I came across wasn#t as good as I hoped. But I will try to come across a more beneficial product so that I can actually show the full extent of my work and not make it a failure.

Summary Statement

The main purpose of this (MFC) is to produce electricity by using a natural element to benefit the world.

Help Received

I had assistance from my dad dealing with strong chemicals that were used to bond the wire to the carbon cloth and drilling in the containers.