**Abstract:**

Global warming is a big problem, and one of the ways people have been trying to stop it is with renewable energy sources. A newer form of electricity generation is microbial fuel cells. They use electrochemically active bacteria to make power, by eating organic fuel, usually mud, and releasing electrons. These fuel cells do not make much electricity but it is an interesting concept. In this project I made three microbial fuel cells, using the instructions from science buddies waste not want project(see bibliography) and tested the effect of using alternative fuels like mashed up fruit and sugar water in microbial fuel cells.

**Introduction:**

Testing different fuel for microbial fuel cells

A fuel cell is a device that turns chemical energy into electricity and fuel cells are important because they generate electricity in a clean and efficient way, and there is a lot of variation in fuel cells, so they can serve a variety of purposes.Electrochemically active microbes can be used in a fuel cell to convert organic compounds into energy by digesting them and releasing electrons.In the design I was using the organic compound was benthic mud(mud from the bottom of the stream under sticks and leaves)The microbes oxidize(lose an electron/charge goes up) and reduce(gain electron/charge goes down) organic compounds, which causes electrons to move around in the bacteria and eventually an electron is released, which creates electricity that can be harnessed by the electrodes.My project studied the voltage being generated between a fuel cell with just mud, a fuel cell that started with just mud and then sugar was added, and a fuel cell that started with just mud and then mashed up fruit was added.

**Discussion Section**

Due to the short amount of time collecting data and water evaporating out of the cathode chamber, the long term effects of adding a new fuel to the fuel cells is unclear, but the results do indicate a few things. The biggest is that adding a new fuel to the fuel cells causes a dip in the power output. Another thing that is indicated by the results, is that if the water level in the cathode chamber drops, so will the power output. Something that was noticed after experimenting had ended was that, whether the reading was taken in the morning or night may have had in effect on the fuel cells.

One factor that could have caused the drop in power when adding the new fuel, is the change in acidity, or pH, could have caused some bacteria to die off or drop in productivity. B might have dropped off because of something like the carbon cloth coming off, or some other problem with the fuel cell. The drop off of all the fuel cells might be because of the water in the cathode dropping leaving behind the salt, causing the electrons to not be able to flow.

Some things I would change for next time if I did this experiment again are that I would take down the temperature of the fuel cells when I take readings, as well as I would refill the cathode chamber when the water level got below a certain level.

**Bibliography:**

Science Buddies Staff. "Waste Not, Want Not: Use a Microbial Fuel Cell to Create Electricity from Waste" *Science Buddies*. Science Buddies, 29 Sep. 2016. Web. 6 Apr. 2017 <<http://www.sciencebuddies.org/science-fair-projects/project_ideas/Energy_p026.shtml>>

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# “What are Microbial Fuel Cells.” *Alternative Energy,* [*http://www.altenergy.org/renewables/what-are-microbial-fuel-cells.html*](http://www.altenergy.org/renewables/what-are-microbial-fuel-cells.html)