CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J1002

Project Title
Optimization of the Water Flow Rate in a Clean Energy Electrostatic Power Generator

Abstract

Objectives/Goals
This experiment had two goals. The first goal was to optimize the water flow rate in a Kelvin electrostatic generator to allow the quickest buildup and discharge of charge. The second goal was to demonstrate the feasibility of using such a device to produce clean power for practical uses, such as lighting fluorescent light bulbs.

Methods/Materials
I built my Kelvin electrostatic generator using plumbing parts and other commonly found materials. To conduct my experiment, I set my flow valve to different positions, measuring the resulting flow rates, and measuring the time between discharges across my sparkers. I repeated this process for each flow rate I tested. Controlling unwanted variables such as the humidity and the gap between the sparkers helped eliminate experimental error.

Results
My results showed the higher the flow rate, the quicker the charge built up. An interesting portion of these results were that there seemed to be two separate phenomena occurring. For the flow rates that broke into drops below the inducer ring my graph showed a straight line with a low sensitivity to flow rate. For the flow rates that broke above the ring, the results formed a curve with high sensitivity to flow rate.

Conclusions/Discussion
According to my results, the higher the flow rate, the less time it takes the generator to spark. One of the objectives of this project was to demonstrate the feasibility of this generator to produce clean energy. This small scale electrostatic generator was able to light up a fluorescent light bulb every few seconds. A larger scale setup likely could produce much higher current, allowing it to provide a great deal amount more useable power. The results from this experiment could help in the design of a larger scale electrostatic generator.

Summary Statement
This project is a study of how different water flow rates affect the performance of a clean energy electrostatic generator.

Help Received
My dad operated a stopwatch and supervised my use of power tools. My science teacher taught me the scientific method and encouraged me throughout the project.