CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
S0915

Project Title
Application of Magnetic Flux and Electric Field to the Recycling and Deodorization of Seawater: A Three Year Study

Abstract

Objectives/Goals
Most modern water treatment systems utilize carbon filters, chemicals, and physical processes to deodorize and remove particles, but this project applies electrodes and magnetic flux to try to accomplish these goals.

Methods/Materials
2 water-recycling models were designed and built, each consisting of a basin with an untreated seawater source, a 5-feet tall plastic soda bottle tunnel perforated with a 9x9 matrix of 1mm-diameter holes on opposing sides of each soda bottle segment, a container for condensation to take place, and tubes to allow the final water condensation to effectively flow out of the systems. Having connected all these components together, we then placed an electrode into each system and applied a 115-V power supply. A magnet stand was added to the circumference of the model. To initiate vaporization, a water heater was placed into the untreated seawater source for tens days. As a control, trials were experimented without the magnet stand and electrode during the same time. Each day, temperatures were measured and the external conditions of the models were observed.

Results
After the electromagnetic treatment, Concentration levels dropped:Carbon dioxide dropped from 2568 to 69 ppm, Nitrate dropped from 39 to 1.3 ppm, iron content dropped from 310 to 2.3 ppm, sulfate dropped from 298,098 to 110 ppm, and manganese content dropped from 0.007 to 0.006 ppm. A similar conclusion can be drawn from the water samples treated without electromagnetism due to the distillation, but the same variables tested did not improve as much as that of the water treated with electromagnetism.

Conclusions/Discussion
This study demonstrated that the application of the right-hand rule of magnetic flux and the inclusion of electrodes produced cleaner and deodorized water, based on the reduction in the levels of carbon dioxide, fluoride, manganese, phosphourus, chloride, salts, nitrates, iron and sulfates, major odor-producing agents of seawater. Coastal waters bear the brunt of our enormous inputs of wastes into the oceans, causing widespread pollution of beaches, proliferation of human viruses, and harmful algal blooms (HABs) which may lead to dead zones. Therefore, it is imperative that seawater be purified through cost-effective and efficient means, and this investigation is considered to be a small step towards this goal.

Summary Statement
This study demonstrates that the application of the right-hand rule of magnetism and inclusion of electrodes indeed produces water with reduced levels of impurities and odor-producing compounds.

Help Received
Ion selective electrodes, Vernier LabPro Software, and spectrophotometers were graciously provided by my school faculty members, Ms. A. Anguiano and Ms. R. Grabow. Many thanks to Mr. M. Anderson of UCR for allowing me to analyze the water samples free of charge, and last, but not least, I acknowledge