CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Jennifer So; Monica So

Project Number

S0814

Project Title

Application of Magnetic Flux and Electric Field to the Recycling and Deodorization of Seawater

Abstract

Objectives/Goals

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

Methods/Materials

To experiment, build 2 models, each consisting of a basin with an untreated seawater source, a 5# plastic soda bottle tunnel perforated with a 9x9 matrix of 1mm-diameter holes on opposing sides of each soda bottle segment, a condensation container, and tubes to allow effective flow of condensation out of the systems. Place an electrode into each system and apply a 115-V power supply. Add a magnet stand to the circumference of one model. The control model will lack a magnet stand and electrodes. Initiate vaporization with a water heater placed into the untreated seawater source for ten days. Each day, measure the temperature & observe the external conditions of the models. Analyze the CO2, salt concentration, chloride content, resistance, & iron content of the untreated seawater before and then the final condensation after the electromagnetic process.

Results

After the electromagnetic treatment, carbon dioxide levels dropped from 2,568 ppm to 69 ppm, salt concentration reduced from 875,000 ppm to 640 ppm. No chloride ions could be detected by the silver nitrate test. The resistance increased from 7.3 kilo-ohms to 85.6 kilo-ohms. The iron content dropped from 310 ppm to 5.62 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

Our 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, chloride, salts, concentration, and 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

Our 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

Our school faculty members provided ion selective electrodes, Vernier LabPro Software, and spectrophotometers. Many thanks to Mr. M. Anderson of UCR for allowing us to analyze our water samples free of charge. We acknowledge Mr. H. So for the advice and purchase of supplies.