CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)

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Project Number

S0502

Project Title

Formation of Disinfection Byproducts: The Effects of Drinking Water Treatment

Abstract

Objectives/Goals

The objective was to test the effect of chlorine on disinfection byproduct formation: 3 source waters from varying locations and 1 "purified" water (Arrowhead bottled water)were collected. As a control, reagent water containing no organic matter. The variables provided were the varying water source types. These types were treated ground water, treated surface water, and raw surface water as well as the control.

Methods/Materials

Four different source waters were collected. Twelve 40mL amber glass vials were used to obtain 3 samples of each water type. A syringe was used to add Clorox Bleach (10 microliters of bleach) to each sample. The samples were then given 7 days to let the total trihalomethanes form in water samples. Then a Gas Chromatograph coupled to a Mass Spectrometer (GC/MS) was used for testing and the results were given by Edward S. Babcock & Sons Inc. (environmental laboratory).

Results

The raw surface water proved to contain the highest levels of total trihalomethanes (THMs) formed which proved my hypothesis correct. However, the Arrowhead bottled water showed to contain nearly the same amount of THMs as the treated ground water. The results also provided the specific THMs (quantity) that formed in the water samples.

Conclusions/Discussion

The results found were supportive of the hypothesis that if a water source contains an elevated content of organic matter, then, upon treatment with chlorine, the disinfection byproducts will be greater. The results supported this because the raw surface water tested proved to hold the most organic materials and also resulted in the most disinfection byproducts formed. On the other hand, the already treated surface water and ground water proved to have very few disinfection byproducts due to their low amounts of organic materials already existent in the water. The higher amount of THMs formed in the Arrowhead bottled water could be caused by its plastic container.

Summary Statement

To test the effect of chlorine on disinfection byproduct formation.

Help Received

Edward S. Babcock & Sons Inc.