



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

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Project Title
Which Hiking Water Purification Method Is Safest?

Abstract

Objectives/Goals
When going on long hiking trips with my Boy Scout Troop, drinkable water is not readily available. Water from the streams can be contaminated by pollution with microorganisms that can make a person sick. There are several different ways of treating the water while hiking. The water treatment methods that we used on our Boy Scout hiking trips included Potable Aqua (Iodine) tablets, SteriPEN# (UV light), and boiling the water for up to four minutes. The objective is to determine the most effective water treatment process when hiking.

Methods/Materials
Collect water sample in sterilized large container from 3 different water sources (1 pond and 2 streams). Take a control water sample from each source in a sterilized test container. Treat 1 liter of each of the water collected using the different water purification methods. Treat using the UV light, Iodine tablets, and heating in a tea kettle on propane stove for just to boil, boiling for 2 minutes, and boiling for 4 minutes. Sample of the treated water is placed in sterilized water test containers. Test each water test sample for coliforms, E. coli, and microorganism count.

Results
Each of the untreated water samples tested positive for Coliforms and E. coli and had bioburden counts of over 900 CFU(colony forming units)/10 ml. The UV light did not remove Coliforms from any of the water samples, and only removed E. coli from one of the 3 samples. The bioburden counts were decreased to between 893 to 2060 CFU/10 ml. The iodine tablets eliminated Coliforms or E.coli and reduced the bioburden counts to between 3 and 748 CFU/10 ml. Boiling water was the most effect treatment method eliminating coliforms and E. coli. Biobudern counts were reduced to between 0 and 95 CFU/10 ml.

Conclusions/Discussion
UV light was the most ineffective water treatment. This process only removed coliforms and E-coli in one of the three water samples. Iodine made water safe in two of the samples but didn#t remove the coliforms from the stagnant pond water sample. Boiling water was the most effective water treatment process. Boiling water is the best process to remove microorganisms to make the water safe for drinking, but you need to be able to carry the required equipment to boil water and have time where you are not hiking to boil the water. Iodine is a very effective alternative way of treating water. Iodine tablets are also light and small so they are easy to pack.

Summary Statement
Which Hiking Water Purification Method is Safest project determines the most effective water treatment process that can be used when hiking in the field..

Help Received
Danilo Ang, Ultimate Labs preformed testing and the test containers, the cooler, and the ice packs; Michael Land, USGS provided sterilized water bottles and hazard protection gloves; my Dad provided materials, drove and hiked with me when I was collecting water and supervised me in treating the water.