

Greater San Diego Science and Engineering Fair

2015 PROJECT SUMMARY

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Project Title: Water - A Tainted Resource?

Abstract

Objectives/Goals

The objective of this experiment was to compare the waters of Europe and United States to the World Health Organization standardized guidelines, and to determine which one is superior in quality and hence safer for consumption. The experiment will involve the testing of the waters of both countries for arsenic, bromine, free chlorine, total chlorine, pH, alkalinity, total hardness, nitrates and nitrites. The hypothesis was that the arsenic level in the United States water would be 3 times that of Europe. It was also predicted that the pH, nitrate and nitrite levels in Europe would be 30% closer to the lower bound of the WHO guidelines than the United States.

Methods/Materials

The Lovibond Arsenic Testing Kit, LaMotte Insta-Test 5 way and Nitrite and Nitrate test strips, collection bottles, timer, camera, tape, gloves, and data recording sheets were used to carry out the experiment. Three water sources were picked in each of the five European and two American cities and three samples were tested within each source. Photos were taken of the test strips after testing to document the color change and the results were logged in the data recording sheets.

Results

Majority of the drinking water sources tested in the US and in Europe had similar chemical level profiles which were within the WHO guidelines. The tap water of the United States and Europe tested negative for arsenic and was found to have all the other analytes and parameters within the recommended ranges. The average arsenic level in Europe was 0.0005 mg/L while that in US was 0.005 mg/L. However, the nondrinking sources, such as seas, oceans, lakes and rivers, generally contained higher levels of nitrates, nitrites, bromine, free and total chlorine.

Conclusion

This experiment demonstrated that pH, nitrate, nitrite, free chlorine, total chlorine and bromine levels in the European waters were closer to the WHO guidelines than the United States'. The average arsenic level in Europe was found to be ten times higher than that of US. This led to the conclusion that although the water quality of Europe is better than that of the United States with regards to the WHO guidelines, the United States has less arsenic in its water than Europe.

Summary Statement

The experiment was conducted to compare the water of Europe and United States and to determine which country has a better water quality. Three water sources were selected in each of the five European and two American cities and three samples were tested within each source for various analytes and arsenic levels. Although the water quality in Europe was found to be more in accordance with WHO regulations than the United States, European waters had a higher average level of arsenic compared to United States. However, certain geographical factors might have played a role and influenced this conclusion.

Help Received

My mother helped me with ordering of supplies and finding a mentor. She was always available to assist with research, collection and testing of the samples. My father planned the entire trip, found possible testing sources, and ensured that I was able to go to all the testing sites safely. Ms. Patsy Schreiber, my mentor, was a huge help in obtaining and correctly using the arsenic testing kit, and providing assistance in the research and analysis of results.