



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

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**Project Title**  
**Evaluation of Drinking Water from Various Sources: Does Bottled Water Have More Contaminants than Other Sources of Water**

**Abstract**

**Objectives/Goals**  
The objective of this project is to test for impurities and contaminants of various water sources in order to perhaps prove that bottled water does have more contaminants than other sources. This experiment was run in order to test for which water source relatively had the greatest number of impurities. The ultimate goal was to see bottled water and ice maker waters as the most contaminated sources out of those that were tested.

**Methods/Materials**  
The materials used were Waters from various sources,a Manifold,bacterial broths,petri dishes,Filter paper,Autoclave,GC-MS,HPLC,Meltemp,sugar,a heater, pH meter,Chlorine meter,and a Becton Dickinson ampoule for Oxidase tests. The Methods used to test the various sources of water were HPLC,GC-MS,Chlorine tests,pH and conductivity,Bacterial tests,and melting point.

**Results**  
HPLC results showed that Irvine and North Hollywood Tap Waters had the highest TDS counts, which shows that they were the most contaminated sources; meanwhile, bottled water had the second lowest TDS count. GC-MS results showed that both the Bottled water and Old bottled water had 198 and 82 peaks respectively leaving them as the most contaminated sources based on this experiment. The Chlorine tests resulted in both the tap waters 1.28 and .58 parts per million of Chlorine; thus, the tap waters were the most contaminated source in this experiment. The Melting Point Data showed that Irvine Tap water had the greatest deviation in temperature from the control,leaving it as the most contaminated; however, bottled water was the closest to the control leaving it as the least contaminated source. The conductivity test resulted in Irvine Tap water having 1064 in comparison to most others that had around 200. Irvine tap water's pH was also fairly low in comparison to the others,which had 7,as it had a pH of 5.01. The bacterial test resulted in bottled water having a too numerous to count result for the TGE broth and it tested positive for oxidase test.

**Conclusions/Discussion**  
Although many results deviated from one experiment to another, the general conclusion was that Irvine Tap Water was the most contaminated source of water that was tested. I was incorrect by hypothesizing that tap waters were less contaminated than bottled waters, but I was successful in proving that bottled water and ice maker water did have many contaminants.

**Summary Statement**  
This project tests to see if bottled water, which is thought to be the purest source by many people, actually has more contaminants than various other sources of water.

**Help Received**  
Professor Prasad Tongaonkar from UCI Department of Pathology helped me with HPLC tests; Rohani Effendi a chemist at OPI helped me perform GC-MS; Susanna Tsang a chemist at OPI helped me perform bacterial tests;