



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Alex P. Mandel	Project Number J1319
Project Title Using Solar Energy to Make Drinking Water Safe	
Abstract Objectives/Goals My objective was to find a way to decrease the time it takes to use solar energy to inactivate pathogens in contaminated drinking water by raising the water's temperature using reflectors, insulation, and tea to darken the water. Methods/Materials I built a Plexiglas box to try to raise the temperature of bottles of water high enough to decrease the time it takes for the sun to inactivate pathogens in the water. First I placed two bottles of water (one clear and one with tea) in the Plexiglas set-up and two similar bottles outside and took the temperatures of the water at regular intervals on sunny days. For the second stage, I added E coli to the water and put .1 ml samples from each bottle on tryptic soy agar plates every hour. I incubated the plates and counted the colony forming units after 24 hours. Results I was able to raise the water temperature to 164 degrees Fahrenheit using the Plexiglas box and tea. In the second stage of the experiment, done on a cool, overcast day, the bottles without tea both inside and outside the box had more E coli inactivated than the bottles with tea, despite the higher temperatures with the tea. The bottle with tea inside the box had more bacteria inactivated than the bottle with tea outside the box. In my control bottle inside the house, the E coli increased during the experiment. Conclusions/Discussion Because I had to do the second state of my experiment on a cool, overcast day, the results did not show that heat affects the inactivation of bacteria by the sun. They do show that exposure to the UV radiation in sunlight inactivates bacteria in water. The water with tea may have had higher levels of bacteria at the end of the experiment because the tea may have blocked the UV radiation from penetrating the water as well, or the tea may have introduced another bacteria into the water.	
Summary Statement My project is about using solar energy to purifying contaminated drinking water.	
Help Received My mom helped by taking some of the temperature measurements during the first phase of the experiment on days when I had to be at school. Gary's Plastics Place cut Plexiglas for me and showed me how to make the box. Dr. Robert Metcalf answered many questions by email. My dad printed the photos.	