



# CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

<b>Name(s)</b> <b>Eden M. Davison</b>	<b>Project Number</b> <b>J1008</b>
<b>Project Title</b> <b>Salt Water Desalination</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of my experiment was to desalinate three different types of salt water by thermal distillation, in order to create fresh water and dry salt as the end products.</p> <p><b>Methods/Materials</b> I built a distillation chamber using wood, mirrors, Lexan polycarbonate sheets, and polyvinyl chloride pipes. In order to simulate solar energy, I used heat lamps to distill the water. I desalinated three types of saline water- Pacific Ocean water, Irish Sea water, and local groundwater with high conductivity. I used a YSI 556 multi-parameter water quality meter to measure pH and conductivity of the water samples before and after desalination.</p> <p><b>Results</b> My hypothesis stated that if I evaporate salt water and condense it to a liquid, then fresh water would be the end result, and dry salt (not brine) would be the end product. My initial experiment involved desalinating 250 mL of three types of salt water for a period of 3 hours. Salt water was determined to have been desalinated if the conductivity of the water, as measured by the YSI 556 meter, was zero. After 3 hours, each of the three types of salt water resulted in approximately 5 mL of desalinated water, and brine (concentrated salt water), but no dry salt. My next experiment involved desalination of 45 mL of each type of salt water, with no time limit. In this second experiment, I was able to obtain desalinated water and dry salt as the final end products, and the experiment run times were between 3 and 12 hours.</p> <p><b>Conclusions/Discussion</b> My hypothesis was supported by the results of my second experiment. In the first experiment the volume of water distilled (250 mL) was too great for the control period of 3 hours. In the second experiment, a smaller volume (45 mL) of each type of water was distilled, and the experiment was run until desalinated water and dry salt were the end products. My purpose for doing this project was to determine if there is a simple, energy efficient, and environmentally safe way to desalinate water, and not have a toxic end product, like brine. The results of my project demonstrated that desalination by thermal distillation is an effective, but slow and energy inefficient means of desalination, and that dry salt and desalinated water are the final end products.</p>	
<b>Summary Statement</b> I created a thermal distillation chamber that effectively desalinated three different types of salt water, resulting in fresh water and dry salt as the end products.	
<b>Help Received</b> I designed the distillation chamber, and my father helped me to build it. My mother, who is an environmental engineer, showed me how to use the YSI 556 multi-parameter water quality meter in order to analyze my data.	