



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Gordon D. Williams	Project Number J1921
Project Title Can Water Boil at Room Temperature?	
Abstract Objectives/Goals The objective of this project is to measure the boiling pressure of water as the temperature is varied and see whether water can boil at room temperature. Methods/Materials A test system was built that had two subsystems: a heating subsystem and a vacuum subsystem. The heating subsystem consisted of an aluminum bowl that holds water, a heater and thermocouple in the bowl, and a temperature controller. The vacuum subsystem was made from a vacuum chamber, vacuum pump, pressure gauge, and valves. The water was heated from 25 to 100 degrees C in 5-degree steps. The vacuum chamber was slowly pumped down at each temperature until the water boiled. The boiling pressure was recorded. Tests were repeated twice at each temperature. Average boiling pressures were calculated and plotted as a function of temperature. Results The lowest temperature that water boiled at in this setup was 30 deg C, at 0.03 bar absolute pressure. The highest temperature was 98 deg C, at 0.99 bar absolute pressure (atmospheric pressure on the day of the tests). Conclusions/Discussion The boiling pressure was fairly repeatable for each temperature. The boiling pressure increased with the temperature in an upward curve. If the curve is extended to a lower temperature, it shows that water should boil at room temperature (20 deg C).	
Summary Statement The boiling temperature of water decreases as the pressure decreases below normal atmospheric pressure.	
Help Received My dad explained how to assemble the vacuum and electrical systems. I drew diagrams and put everything together except for epoxying in the wires. My neighbor showed me how to use his mill. My dad read the pressure off the gauge while the system pumped down.	