



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Jenna D. Morris	Project Number J0409
Project Title Catalase Kinetics: The Effect of the Temperature of Catalase Enzymes on Hydrogen Peroxide	
Abstract Objectives/Goals The objective is to determine at which temperature the enzyme catalase generates oxygen from hydrogen peroxide at the maximum rate. I believed that the catalase would exhibit its maximum enzymatic activity at 37°C. Methods/Materials Catalase was extracted from ginger root. Reactions were tested at 0°C, 23°C, 37°C, and 50°C. When the hydrogen peroxide was added to a constant volume of enzyme solution, the volume of oxygen generated was measured at 30 second intervals by the displacement of water for five minutes. There were six identical trials for each temperature. Results The 23°C catalase preparation produced oxygen maximally at an average rate of 9.2 ml/sec. The hypothesized optimum temperature of 37°C had an average rate of 7.1 ml/sec. At 0°C the enzymes produced oxygen but at a significantly slower rate of 2.3 ml/sec. At 50°C the catalase denatured with only an average rate of .2 ml/sec. Conclusions/Discussion My results differ from my hypothesis because I based my hypothesis on an anthropocentric preconceived notion. My thoughts were based on what I knew of human catalase and its optimum temperature of 37°C. However I used enzymes from the ginger root which grows in the soil at 25°C or lower. To further this study in biochemistry I might experiment with human catalase and learn if the normal human body temperature, 37°C, is in fact the optimum temperature of the catalase.	
Summary Statement I tested the effect of the temperature of ginger root catalase activity and found it to be maximal at 23°C.	
Help Received I received frequent long-distant e-mail advice from Dr. Carl W. Vermeulen, Retired Professor of Biology, The College of William and Mary, Williamsburg, VA, and now webmaster of Science-Projects.com.	