



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Serena K.T. Low	Project Number 36891
Project Title Effects of Temperature on Catalase Enzymes	
Abstract Objectives/Goals The objective of this study is to measure and find which temperatures are optimal for catalase enzymes to work in by testing the reaction time of catalase enzymes and hydrogen peroxide. Catalase enzymes work to decompose hydrogen peroxide into water and oxygen, as hydrogen peroxide can cause harmful oxidative damage. Hydrogen peroxide is usually formed as a byproduct of metabolism. Enzymes are special types of proteins used to initiate chemical reactions. Without enzymes, reactions would not occur fast enough to sustain human life. In this experiment, filter paper dipped in potato catalase is dropped in a test tube of hydrogen peroxide solution (with varying temperatures) and the time the papers take to float to the top of the test tubes are measured. Methods/Materials Test tubes, hydrogen peroxide solution, thermometer, water, mashed potato (used for catalase), 5mm by 5mm filter papers, and stopwatch. Measured times for filter paper dipped in potato to float to the top of the hydrogen peroxide solution at various temperatures. Results The optimal temperature of catalase enzymes is about 35°C; due to the faster reaction time with the hydrogen peroxide solution. The optimal temperature was hypothesized to be around human body temperature (37.5°C). Two trials were run to provide more accuracy of the data. Both trials showed faster reaction rates around 35°C and 40°C. Temperatures too low or too high provided slower results. Conclusions/Discussion Repeated trials proved that the reaction rates between catalase enzymes and hydrogen peroxide were faster in hydrogen peroxide solutions of temperatures 35°C and 40°C, as hypothesized. In conclusion, catalase enzymes work best at temperatures around body temperature (37.5°C), and do not work as well around temperatures 30°C or lower, or 45°C or higher.	
Summary Statement I showed that temperatures affect the reaction rate between hydrogen peroxide and catalase enzymes.	
Help Received I improvised the experiment procedure after doing some online research, and conducted the experiment myself. I also received help from a parent in understanding the statistical results of my project.	