



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Sonam H. Patel	Project Number J0518
Project Title Catalytic Conquest: Exploring the Effect of Temperature, H₂O₂ Concentration, and Alcohol on Catalase Kinetics	
Objectives/Goals 1. Adding more substrate will increase the volume of oxygen linearly, so the rate of oxygen production / concentration of peroxide should remain constant. 2. The higher the temperature, until the optimum temperature is reached, the faster the reaction will proceed. I believe the optimum will be lower than human body temperature. An increase in temperature increases the activity of molecules and increases the likelihood of interaction. 3. Alcohol will inhibit catalase activity since it competes for the same binding site as peroxide.	
Abstract Methods/Materials 1. Blend 100 grams of sweet potato mixed with 150 mL of water and blended it into a house hold blender, final concentration of .50 g/mL of catalase. Aliquots of 2.5 mL were used as the source of catalase for all experiments, placed in three-valve flask(E). Varying amounts of peroxide added through syringe(C). Oxygen volume measured in mL through syringe (G). 2. Flask placed in water bath, placed on top of heating plate. Thermometers recorded water bath and internal catalase / peroxide temperature. 2.0 mL of peroxide added to flask through C. Oxygen generated during the reaction was measured over time in set periods(10 seconds)in the syringe. Starting temperature was 20 C, from which water bath temperature was raised or lowered. 3. Alcohol added through same syringe as peroxide(C)in varying amounts, 1.0 mL, 1.5 mL, 2.0 mL. Amount of peroxide(2.0 mL)and catalase (2.5 mL of .5g/mL) was kept constant. Syringe,Thermometer,Rubber Stopper,Hydrogen Peroxide,Ethanol,Water bath,Heat Plate	
Results 1. With varying amounts of H ₂ O ₂ at room temperature, we found that with more substrate amount, the oxygen production was higher. 2. The rate of O ₂ production is higher at 25 degrees and 35-37 degrees. 3. Alcohol inhibits the catalytic activity, therefore, not much O ₂ is produced.	
Conclusions/Discussion In line with my hypothesis, the higher the temperature, the faster the reaction progress, until it pasts a certain temperature. Secondly, increasing the concentration of peroxide did not increase the rate of oxygen production per unit peroxide added. Lastly, alcohol has an inhibitory effect on catalase activity.	
Summary Statement My project is on how different variables, such as hydrogen peroxide, temperature, and alcohol, affect the rate and volume of oxygen produced in a catalytic reaction.	
Help Received Parents helped with research and materials; Brother helped with the experiment; Cousin reviewed write-up	