



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

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Project Title It's Enzyme Time!	
Abstract Objectives/Goals Many enzymes are essential to the vital biological processes and reactions that take place inside our body. However, enzymes catalyze reactions in very specific types of environments. The researchers have tested how the following variables affect the rate in which the enzyme catalase catalyzes the chemical reaction where hydrogen peroxide decomposes into water and oxygen: 1) the concentration of the enzyme present, 2) temperature, 3) inhibition by metal ions, and 4) pH. Methods/Materials This experiment was done by measuring the amount of time (seconds) it will take for a paper filter disc dipped in a solution of catalase to rise in a 1% hydrogen peroxide solution, affected by each of the variables mentioned above. By writing and forming an equation, the time it took for the disc to rise in the hydrogen peroxide was converted to the velocity of oxygen production in the catalyzed reaction measured in moles per second. When more oxygen is produced, the reaction is catalyzed at a faster velocity. Results Data gathered from this experiment suggest that the optimum velocity in which catalase catalyzes reactions is when 1) the concentration of the enzyme is the greatest, 2) the temperature of the environment is between 20 and 30 degrees Celsius, 3) the least amount of copper(II) sulfate is added to the catalase solution, and 4) the pH is between 4.5 and 5. Conclusions/Discussion In this experiment, the researchers have found that their hypothesis was partially incorrect. Also, the data also follow proven chemical principles, since there is only a specific range in which the optimum catalase activity could be reached. By forming the conversion equation, in our studies, we have created a new method in which the assay for enzyme activity can be calculated through an indirect observation. If this experiment were to be repeated, we would also want to test with the various enzymes found in the fruits and vegetables we eat every day. Particularly, we would search for the enzymes that are applicable to rules of the Michaelis-Menten equation. Also, if possible, we would research for a more efficient way of describing the velocity of oxygen production (mol/sec).	
Summary Statement This project tests how the catalytic rate of the enzyme catalase is affected by the concentration of the enzyme present, temperature, inhibition by metal ions, and pH.	
Help Received Our teachers provided us with equipment, our parents bought the supplies, and our science teachers helped proofread our written report.	