



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

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Project Title Catalase: Beware, Ions Are Sneaking Around	
Abstract Objectives/Goals My objective was to see how different ions affect the enzymatic decomposition of hydrogen peroxide. Throughout the course of my research, I had formulated a hypothesis that the addition of ions will impede the reaction of oxygen production because the ions can distort the catalase making the enzyme inactive and of no further function. Methods/Materials First dilute 3% hydrogen peroxide (0.88 molar concentration) into 0.4% hydrogen peroxide(0.11 molar concentration) by mixing 13.5 ml of 3% hydrogen peroxide into 110 ml of distilled water. Next make a stock solution of all three salts (sodium chloride, calcium chloride, aluminum chloride) at the concentration of 0.05 moles and 0.025 moles. In order to make a buffer, you put sodium phosphate and potassium in 100ml of distilled water. Then dissolve 220mg of catalase into 10ml of distilled water. Put 1ml of the catalase in a clean sample bottle and 4ml of distilled water along with 10ml of hydrogen peroxide solution (control). Seal the sample bottle with the oxygen sensor and observe and record your results. For the reactant testing (sodium chloride, aluminum chloride, calcium chloride) add the 3ml stock solutions along with the control; however add 1ml of distilled water and 3ml of the PH buffer. Results As I measured the oxygen production of the salt ions I noticed that calcium chloride's last average reading had the greatest gap of all the salts compared to the control (2.6%). However this was at 0.025 moles so I immediately realized that this gap was quite small and could be potentially increased. After I tested the salts at 0.05 moles I saw the same results as before except with sodium chloride I noticed an immediate leap in inhibition from 1.4% to 2.4%. So we can interpret from the results that calcium chloride had the greatest inhibition effect of all three salts. Conclusions/Discussion Due to the test results it appears that of the three salts, calcium chloride completely inhibited the decomposition of hydrogen peroxide. Although the other salts did inhibit the production of oxygen and water, calcium chloride had inhibited it at the highest rate. With these results I can see that these salt ions can help with the accumulation of hydrogen peroxide which can be the start of many illnesses to come.	
Summary Statement Interestingly the non-competitive nature of the salt ions had distorted the catalase enzyme so it	
Help Received Parental help in guidance of the experiment	