



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

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Project Title The Effect of Temperature on an Enzyme's Ability to Digest Protein	
Abstract Objectives/Goals I conducted this experiment to test the effect of temperature on the ability of the proteolytic enzyme bromelain (found in pineapple) to digest protein. My independent variable is the different temperatures measured in Kelvin. The dependent variable is the proteolytic activity measured as solid or liquid. I hypothesized, as the temperature increases the efficiency of enzyme decreases. Methods/Materials First I numbered the test tubes 1-10, and labeled the remaining test tube as "RT" room temperature. Second I designed a temperature gradient ranging from 273.15-373.15 Kelvin, in increments of 10. Then I recorded the test tube numbers and corresponding temperatures assigned for each. Afterwards, I added 3 ml pineapple juice to each tube, and heated (or cooled) each test tube to the appropriate temperature, (leaving test tube "RT" at room temperature). Then, I added 10ml gelatin to each test tube and refrigerated them overnight. On day two, I checked each test tube for liquidity of the contents and recorded my observations. Results I found that the bromelain enzymes that were exposed to temperatures 353.15 Kelvin and above, lost their efficacy for digesting protein, as shown by the contents' solid state. However it is interesting to note that the test tube exposed to the temperature of 343.15 Kelvin did contain a minor amount of solidification at the bottom. Conclusions/Discussion The data supported my hypothesis, that as the temperature increases, the enzyme's ability to digest protein decreases. An enzyme's function is related to the 3-dimensional structure of its molecule. This structure can be altered by heat, thus causing the enzyme to lose its normal function.	
Summary Statement The purpose of this experiment was to determine the effect of temperature on the ability of the proteolytic enzyme bromelain to digest protein.	
Help Received	