



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

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Project Title Effect of Temperature on Vitamin C Content of Fruits and Vegetables	
Abstract Objectives/Goals To test the impact of temperature on vitamin C concentration levels in different fruits and vegetables and find the most beneficial and idealistic way of increasing daily vitamin C consumption by making simple and small changes to the average diet. Methods/Materials 700ml of fresh extract was strained from lemon, pineapple, and grapefruit and was stored in different environments. The samples were refrigerated for 4 hours at 2.78°C, cooked until reaching 90°C for 5 minutes, and tested raw at room temperature. The vitamin C levels were then tested using the redox titration method. The extract was titrated with a prepared starch indicator solution and iodine tincture. As the iodine was added, the vitamin C was oxidized and the excess iodine reacted with the indicator to create a blue-black color in the liquid. The amount of iodine needed to complete the reaction was recorded. A 250mg vitamin C tablet was tested and used as a proportion to determine concentration levels of other samples. The procedure was repeated with onions, tomatoes, and daikon, but the extracts were diluted to the ratio of 75ml water to 100ml extract. Results 9 trials each were completed for 6 fruits and vegetables. It was consistently found that the raw extracts contained the most vitamin C, while the cooked and chilled samples were depleted of vitamin C in all trials. Tomatoes and grapefruit had the least average presence of vitamin C when chilled. The onions, daikon, lemons, and pineapple lost the most vitamin C after being cooked. The chilled and cooked sample data was very similar. Conclusions/Discussion Exposure to different temperatures demonstrated a significant impact on the vitamin C concentration of the fruit and vegetables. Raw extracts at room temperature were found to contain the most Vitamin C. Boiling and chilling the extract samples caused decline in Vitamin C levels. This data contradicts my hypothesis of the chilled condition aiding in the preservation of vitamin levels. It was found that the most beneficial and idealistic way of increasing vitamin C consumption is by eating vitamin C rich fruits and vegetables raw and storing them outside, not in the fridge or cooking them.	
Summary Statement The titration method was applied to measure vitamin C concentration levels of different fruits and vegetables after being exposed to different environments and temperatures.	
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