



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Annie Renas	Project Number J0621
Project Title Causes and Effects of Vitamin C Depletion through Heat Application	
Abstract Objectives/Goals Because Vitamin C is an essential vitamin for health, my objective was to test the impact of heat applied through common cooking methods on the vitamin C levels in fruits. This project was performed with the intention to educate the American community of the most healthful ways to prepare foods and be able to consume as much vitamin C as possible. Methods/Materials 6 oranges and 6 tomatoes, two fruits high in vitamin C, were cut into quarters and baked, steamed, microwaved, and tested raw. Once the fruits reached 140 degrees Fahrenheit, they were juiced and titrated with an indicator solution made of iodine and starch. The vitamin C reacts with the indicator solution, causing it to turn clear, a reversal of the redox reaction. Based on the number of drops of juice it took to turn the indicator solution clear, this exemplified the content of vitamin C in the morphed juice. A control made of a 100mg vitamin C tablet dissolved into one liter of warm water was also titrated raw and microwaved. Results In the orange samples, the concentration of vitamin C in order from greatest to least was raw, microwaved, baked and steamed. For tomatoes, the concentration of vitamin C in order from greatest to least was microwaved, baked, raw and steamed. However, in the control, the unheated vitamin C tablet contained four times the amount of vitamin C compared to the microwaved vitamin C tablet. Conclusions/Discussion Averages from both tests demonstrated that microwaving increased the available vitamin C, then baking, raw, and lastly steaming. My results showed that steaming is the most insalubrious heating method for vitamin C because vitamin C, being a water-soluble vitamin, is dissolved in condensation and water vapor through the steaming process. To explain why the microwaving of the fruit samples lead to an increase in vitamin C in the titration test, additional tests may be necessary, but one possible explanation could be that, because neither tomatoes nor oranges are consistent inside, there may have been vitamin C stuck in fibrous bundles or concentrated in a particular part of the fruit, that were released after microwaving.	
Summary Statement Within these studies, a titration of vitamin C in common fruits with a simple indicator solution, demonstrates how vitamin C is depleted or enhanced by common cooking methods.	
Help Received Parents, school science advisor and science teacher proofread my report. School science advisor helped with the research. Science teacher lent beakers, test-tubes, and test-tube holders.	