



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

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Project Title
Determining the Amount of Vitamin C in Boiled Broccoli

Abstract

Objectives/Goals
The objective is to determine how varied times of boiled broccoli affect the Vitamin C content.

Methods/Materials
I made a control Vitamin C by crushing a 500 mg tablet of Vitamin C and dissolved it in 500 mL of water (creates 1mg/mL solution). I measured out 20 mL of the solution. (20 mg of Vitamin C). I created a starch solution to add to the 20 mg of Vitamin C solution. I slowly added the iodine into the Vitamin C solution and starch mixture, stirring it in and counting each drop. When the titration process was complete, the solution turned and stayed a dark blue. The number of drops is the amount of iodine needed to oxidize 20 mg of Vitamin C. I did the same process using 5 g of crushed broccoli boiled at 1 minute, 5 minute, and 10 minutes. 5 trials were performed for each of the times. I mixed the liquefied broccoli with 20 mL of water. I calculated the amount of Vitamin C in each trial by dividing the number of drops for the broccoli by the number of drops for the Vitamin C solution, multiplied by 20 to cancel out the 20 mg of the control Vitamin C to give the amount of Vitamin C in 5 g of that boiled broccoli.

Results
I found that increasing the boiling time of broccoli will result in a decreased amount of Vitamin C.

Conclusions/Discussion
I had hypothesized that boiling broccoli for 1 minute would contain the most Vitamin C. My results showed this. The 5 minute boiled broccoli came in second place and the 10 minute boiled broccoli came in third. My experiment could help others in the future by using this comparison to find an optimal boiling time for broccoli so it is soft enough to chew, but still retain most of its Vitamin C. After completing the experiment, one thing I would alter is performing 5 Vitamin C control trials to determine a more accurate average. Additionally, I could steam or fry broccoli.. Since Vitamin C is water soluble, steaming/frying would have less water contact thus retaining more Vitamin C.

Summary Statement
I found how the boiling time of broccoli affected the amount of Vitamin C it contained by using an iodine/starch titration method.

Help Received
My parents and science teacher helped me revise my work.