



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

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Project Title
Gotta' Sweet Tooth: Does Microbial Fermentation Produce Acid in the Mouth with Aspartame and Various Sugars?

Abstract

Objectives/Goals
The objective of my project was: does microbial fermentation produce acid in the mouth with the artificial sweetener (Aspartame) and various sugars? I thought that the microbial fermentation will indeed result into acid production. My hypothesis was based on the fact that aspartame and sugar contain alcoholic group that oxidizes into organic acid.

Methods/Materials
In order to test my hypothesis, I needed to make a stock culture of Saccharomyces Cervisiae (Yeast) and acetobacter aceti bacteria. These microbes were used to inoculate 10% (v/w %) solution of the substrates: sucrose, fructose, glucose, galactose, and aspartame. Six sterile flasks, for the fermentation process, were labeled for the control and all the substrates. To prepare the control sample, 25ml of deionised water, 3 ml of peptone broth, 1ml of yeast, and 1ml of acetobacter aceti were put in flask. And for testing substrates the same total volume as a control was put in other flasks#25ml of 10% substrate solution, 1ml of yeast, 1ml of acetobacter aceti and 3ml of peptone broth as growth promoter. The flasks were then covered with aluminum foil and placed in an incubator at 37 C. After the incubation period (24 hours) biomass from the testing flasks was filtered. The pH values of each of the filtrate samples were checked for acidity. Acid-base titration method was conducted to measure organic acid production quantitatively. For the titration process, 0.1M NaOH standard solution was prepared by weighing out 2g of NaOH in 500ml of distilled water. A buret was then filled with NaOH solution. Two drops of phenolphthalein were added to the flasks containing fermented substrate solutions. The process began by slowly adding the standard solution while swirling the flasks. A pink color appeared, but soon disappeared. When the pink color began to linger, this point was known as the equivalence point (Point where acid is neutralized by the base.) Calculations were done to find out the percent mass of organic acid.

Results
Consistently, it was found that as the volume of alkali increased, the higher amount of organic acid present.

Conclusions/Discussion
My hypothesis was proved correct. Aspartame and sugars all resulted into organic acid. Aspartame oxidized into formic acid, and the various sugars oxidized into acetic acid.

Summary Statement
My project is about measuring percent of mass of organic acids produced by various sugars and artificials sweetener.

Help Received