



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

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Project Title
Vinegar pH and CO(2) Production in the Reaction with Baking Soda

Abstract

Objectives/Goals
My question was "how does the pH of different types of vinegar affect the amount of CO(2) produced when mixed with a fixed amount of baking soda." My hypothesis was that the amount of CO(2) produced would be directly related to the pH of the vinegar.

Methods/Materials
Materials:

1. baking soda	3. pH meter	9. plastic tube	15. pipettes
2. vinegar white	4. electronic balance	10. 1-hole stopper	16. pipettor
apple	5. weighing boats	11. rubber sleeve	
balsamic	6. side arm flask	12. long balloons	
rice	7. Petri dish	13. 400 ml beaker	
	8. rubber bulb	14. 500 ml cylinder	

Methods:

1. Measure and record the pH of each type of vinegar.
2. Mix 2 grams of baking soda in the sidearm flask with 8 ml of each type of vinegar.
3. The CO(2) that was produced was collected in a balloon.
4. The chemical reaction was allowed to continue for 3 minutes and the balloon was tied.
5. The balloon was submerged in a water-filled beaker, and the amount of water displaced was measured with a graduated cylinder.
6. This procedure was repeated three times for each of the four vinegars.

Results
The pH's of the four vinegars franged from 2.55 to 3.18: white (2.55), rice (2.72), balsamic (3.05), apple (3.18), but there was no correlation between the pH of the vinegar and the amount of CO(2) produced.

Conclusions/Discussion
The acidity as measured by pH was not related to the amount of CO(2) produced. Therefore, my hypothesis, that the amount of carbon dioxide released would be directly related to the pH, proved to be wrong.

Summary Statement
I tried to show that the pH of different vinegars would predict how much carbon dioxide would be generated when reacted with baking soda.

Help Received
My father helped me set up the side arm flask and he showed me how to use the pH meter and the balance. This was done in my father's microbiology lab at UC Irvine.