



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Patricia Bender; Paul W. Howard Mullan	Project Number J0505
Project Title Acidity in Sodas	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of our experiment was to see if there is a relationship between acidity in sodas and carbohydrates. Our next question was to see if caffeine influenced pH.</p> <p>Methods/Materials Materials: 2 or more cans/bottles of 27 discrete types of soda 0-14 litmus paper 50 ml beakers We recorded the number of grams of carbohydrates and sugars listed on each container of soda. We used a 40 ml sample of each soda immediately after opening. We submerged litmus paper in the sample for 10 seconds and then matched it to a chart to determine the pH. Duplicate sodas were purchased after 30 days and the process repeated to verify the data.</p> <p>Results The pH of the sodas and water we tested ranged from 2 to 7. There was not a relationship between carbohydrates and pH or caffeine and pH.</p> <p>Conclusions/Discussion We learned a great deal about pH, citric acid, phosphoric acid, carbonic acid, caffeine and sugars creating carbohydrates as we tried to understand the soda's ingredients and tested component ingredients' pH. Variables other than carbohydrates such as grapefruit flavors and citric acid seemed to lower the pH but multiple brands would need to be tested to verify this. Our hypothesis that sodas with more carbohydrates would be more acidic was wrong. Caffeine did not seem to affect pH. Patricia thought diet sodas would be less acidic, but the ones we tested all had a pH of 3 or 4 which was in the middle of the range. Paul's initial hypothesis about root beers being slightly basic was wrong although he was right that they are less acidic than other sodas. We concluded that carbohydrates were not a significant factor in determining the pH of sodas. We learned that carbonic acid is formed in solution when sodas are infused with carbon dioxide. Carbonic acid (H₂CO₃) is a weak colorless acid formed by the solution of carbon dioxide and water. Our conclusion is that sodas are acidic because CO₂ is added. A possible source of error in our project revolved around the litmus paper. We tried several brands and found one to be more reliable than another, so we had to redo trials that had been completed with substandard litmus. If we were to redo this project, we would use a pH meter for more precise measurements.</p>	
Summary Statement Our project was to determine if the amount of carbohydrates in various brands of soda predicted their acidity.	
Help Received Paul's dad supervised the muriatic acid extension, Paul's mom took pictures and helped type, and our teacher helped us with background research to better understand pH and carbohydrates.	