CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Nicholas T. Johnson

Project Number
S0508

Project Title
The Effects of Temperature and Type of Container on the Concentration of Dissolved Carbon Dioxide in Soda

Abstract

Objectives/Goals
The purpose of this experiment was to find the effects of temperature and type of storage container on the concentration of dissolved carbon dioxide in soda.

Methods/Materials
The hypothesis was tested by placing a 2 L bottle of soda and a 2.625 L collapsible bag into a refrigerator and a 2 L bottle of soda into room temperature. 500mL samples were removed from the bottles and smaller samples of 30, 60, and 90 mL were taken from the larger sample and put into a small, sealed squirtbottle connected to a pressure sensor. The squirtbottle was shaken until the pressure no longer changed. The sodas were then shaken (to speed their equilibrium) and replaced in their environments. The values were used to create a line whose slope was the concentration of the sample (found through algebra). The process was repeated until the containers were empty and then repeated for multiple trials.

Results
The data supported the hypothesis. The refrigerated bottle easily had more dissolved CO2 than the room temperature bottle (.0919 moles/liter vs. .0598 moles/liter) and finished with slightly more than the room temperature bottle. The collapsible bag (kept in the refrigerator) retained most of its carbonation (73.7 % vs. 23.8 % and 28.7 % for the bottles) despite starting with less (because opening the bottle and transferring the soda caused it to lose carbonation). The overall percent deviation was 7.8%, making the data fairly precise.

Conclusions/Discussion
The bag worked best because its valve didn#t allow the CO2 in the headspace to escape, leaving more pressure above the liquid and more carbon dioxide in the soda. The refrigerated bag started with more dissolved CO2 simply because carbon dioxide is more soluble at lower temperatures.

Summary Statement
The effect of temperature and type of container on the amount of dissolved carbon dioxide (carbonation) in soda

Help Received
Borrowed sensors from my science teacher