CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
J0606

Project Title
Kinetics of Alka-Seltzer Reaction

Abstract

Objectives/Goals
The objective of my project was to determine how water temperature affected the rate of reaction and quantity (volume) of carbon dioxide produced by an Alka-Seltzer tablet. My hypothesis was that the rate of production of carbon dioxide from an Alka-Seltzer tablet would increase with an increase in water temperature, but that the quantity of carbon dioxide produced would remain constant.

Methods/Materials
I performed my experiment first by testing cold tap water, then ice cold water, and finally hot tap water. For each water temperature, I conducted four trials. Clear plastic tubing was connected from the bottle cap to an upside down 250 mL graduated cylinder full of water, which was kept inside a rectangular plastic box one-thirds full of water. For each trial, I put 4 oz of water in an empty plastic bottle, checked the water temperature, and dropped one Alka-Seltzer tablet into the bottle; I quickly put the cap on the bottle. Immediately after dropping the tablet into the water, I started the stop watch and noted the level of water in the graduated cylinder every ten seconds until the water level was no longer changing inside the cylinder, indicating that the reaction was complete. I also noted down the time to complete the reaction.

Results
As compared to ice cold water, hot tap water produced 135% more carbon dioxide and reaction time was almost 80% faster. Also compared to ice cold water, cold tap water produced 54% more carbon dioxide and the reaction time was 40% faster.

Conclusions/Discussion
My hypothesis was partially correct; the rate of production and quantity of carbon dioxide produced increased with an increase in water temperature. The rate of carbon dioxide increased with an increase in water temperarure because the warmer a substance is, the faster its particles move, causing a swifter reaction. Volume of carbon dioxide produced increased with an increase in water temperature in accordance with the Law of Volumes which states that at constant pressure, the volume of a gas is directly proportional to the temperature on the absolute temperature scale.

Summary Statement
I wanted to see if water temperature affected the rate of production and quantity of carbon dioxide produced by an Alka-Seltzer tablet.

Help Received
My parents helped me with the setup of the experiment and helped me organize my data.