CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J0509

Project Title
How to Increase the Speed of a Reaction

Abstract

Objectives/Goals
Reaction rate is what determines when bombs go off, and how we digest food. But can you change the speed it occurs? In order to find this out, I took two possible factors, particle size and temperature, and put them to the test. This project will look at the effects of both particle size and temperature on reaction rate.

Methods/Materials
These factors will be tested with alka-seltzers inside a gas collecting apparatus (air tight bottle connected by tube into a graduated cylinder filled with water). For particle size, 3 trials were done for 4 different particle-sizes (Whole seltzer, Half, Quarters, Powder). Trials were done for particle size by dropping the tablet into the bottle and quickly shutting the cap. For testing temperature I did 3 trials for 3 different temperatures (Room Temperature, Cold, Boiling). Trials were done by pouring the water until the standardized level has been reached, and dropping a whole alka-seltzer into the bottle and quickly shutting the cap.

Results
For the Particle Size experiment, as the tablet was broken up into smaller pieces, the reaction grew to become faster. The tablet in its entirety proved to cause the slowest reaction, however as powder, the reaction was the fastest. In the Temperature experiment, as the temperature of the water grew to become higher, more carbon dioxide was produced at a faster rate. Cold water caused absolutely an extremely slow reaction to take place, while boiling water caused an extremely fast one, contrarily.

Conclusions/Discussion
My hypothesis was that if temperature and particle size was a factor, the reaction would speed up and more CO2 will be produced within a shorter amount of time. The results of the experiment supported my hypothesis and both boiling water, and powder tablets had great significance in speeding up the reaction. This experiment showed that scientists and chemists are able to speed up reactions by using powder instead of solids, and warmer or scalding substances and temperatures as opposed to lukewarm or cold. Increasing temperature, however, would result in the fastest reaction. An even faster reaction is set to take place if both powder and warmer temperature is used.

Summary Statement
This project was done in order to find a way to speed up a chemical reaction, and to find the way in which it is most effectively done.

Help Received
Mother bought materials.