CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)

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Project Number

J0501

Project Title

Wet Heat: Can You Cook with Chemical Reactions?

Abstract

Objectives/Goals

This experiment will document the way in which the starting temperature affects an exothermic reaction. The reaction to be tested is an instantaneous reaction between Calcium Oxide and Water. Calcium oxide is also referred to as Lime or Quicklime. This will help determine the different conditions in which the reactions could be used in commercial applications. The hypothesis was that, if the two chemicals are reacted at different starting temperatures, then colder temperature will invoke a higher temperature gain, because research shows that Calcium Oxide is more soluble in colder water, which should yield a greater surface area for the reaction.

Methods/Materials

The reaction was tested at three different temperatures, with the goal of covering a wide range. Each starting temperature was tested three different times, for a total of nine trials. The first set of trials was at five Degrees Celsius, the second set was at twenty Degrees Celsius, the third at 65 Degrees Celsius. The chemicals were reacted in a glass bowl, with a three to one ratio, by weight, of Quicklime to Water The temperature of the reaction was recorded every ten seconds.

Results

The results refuted the hypothesis. The gain in temperature increased progressively with a gain in starting temperature. It is important not to judge the reaction by the peak temperature that it reached, because the starting temperature would inherently change this value. The reaction with a starting temperature of 5 Degrees produced an average temperature gain of 65 Degrees. The reactions at 20 Degrees and at 65 Degrees produced an average temperature gain of 70 and 95 Degrees, respectively.

Conclusions/Discussion

One explanation for the data is Brownian Motion. Brownian Motion, the small, random movement of small particles, decreases as the temperature decreases. Brownian motions causes the Quicklime particles to remain suspended in the water, allowing the chemicals to more fully react. At higher temperatures, there is more Brownian Motion, and therefore a more violent reaction.

Summary Statement

Testing different starting temperatures of a chemical reaction between Quicklime and Water in order to find out how the starting temeprature would affect the reaction and its commercial uses.

Help Received

Father supervised with safety. Teacher gave format for report.