CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

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Project Number

34795

Project Title

Investigating the Effect of the Initial Temperature on Hand Warmer (Sodium Acetate) Reaction

Abstract

Objectives/Goals

The objective of my project is to find the ideal initial temperature (-8, 8, 20, or 40° C) of a reusable hand warmer to produce a more efficient hand warmer (longer lasting and greater heat generation). My goal is to prove that 40°C is the best initial temperature.

Methods/Materials

To do this experiment, I first put the hand warmers into water baths to get the desired temperature (-8, 8, 20, or 40°C). After activating the hand warmer, I measured its temperature (using an infrared thermometer) in specific time intervals for 1 hour and 30 minutes. My independent variables were the initial temperatures, and the dependent variable was the heat production of the hand warmers. My controlled variables included: the hand warmers, the time intervals of measuring the temperature, and the duration of time.

Results

The results show that the 40°C initial temperature helped to generate a longer lasting heated hand warmer. On average, the temperature drops (from the peak temperatures) of the 40°C was 12°C, 20°C was 19.2°C, 8°C was 16.2°C, and the -8°C was 13.4°C. The average peak temperatures of the activated hand warmers were: 54.3°C for 40°C, 51.8°C for 20°C, 47.8°C for 8°C, and 39.2°C for -8°C.

Conclusions/Discussion

In conclusion, I found that the 40°C initial temperature was ideal for a longer lasting hand warmer, proving that my hypothesis was partially correct. The reason for this was I also found that the -8°C produced a larger amount of heat generation than the 40°C.

Summary Statement

My project is finding the best initial temperature for an efficient heat generating hand warmer when activated.

Help Received

My mother helped type report.