CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
Ojas Nain

Project Number
J2109

Project Title
Got Hurt? Make a Cold Pack at Home!

Abstract

Objectives/Goals
The objective is to determine whether an instant cold pack can be made using household chemicals, that is as effective as commercially available instant cold packs.

Methods/Materials
Baking Soda, Ammonium Nitrate, Scott's weed and feed Fertilizer and Morton Salt Substitute (100g in each trial) were mixed with water (100ml) in a Ziploc bag to produce an endothermic chemical reaction. Three trials were conducted. The solution temperature was measured over duration of 15 minutes at one minute interval to determine whether solution temperature stays below or close to 32°F for it to be used as an effective instant cold pack. Finally, the results were compared with a commercially available instant cold pack ("Equate Instant Cold Pack") to compare the performance by performing the same trial.

Results
Only Ammonium Nitrate solution in a Ziploc bag demonstrated an endothermic chemical reaction, strong enough to cause the temperature to
drop below freezing temperature of water (32°F) to an average of 21°F over the three trials. Other household compounds considered in this experiment, did not demonstrate sufficient temperature decrease to be considered for an instant cold pack. Due to lack of insulation in the Ziploc bag, the solution temperature rose above 32°F within four minutes to render it ineffective. Commercial instant cold pack held the temperature below 32°F up to 12 minutes from the time of activation.

Conclusions/Discussion
An instant cold pack could be made at home by mixing Ammonium Nitrate and water. However Ziploc bags did not provide sufficient insulation to hold the temperature below freezing for the duration of more than 4 minutes in the experiment. An effective cold pack should keep the temperature around or below 32°F for almost 15 minutes. This research can be expanded to include cost effective insulated bags instead of Ziploc bags. It also should be of interest if chemical reaction could be controlled using a slow release method of Ammonium Nitrate while creating the solution.

Summary Statement
Making an instant cold pack at home using household chemicals that exhibit an endothermic chemical reaction when mixed with water.

Help Received
My mother and father helped me in decorating the display board and typing the report. My teacher helped in selecting the project and provided me with guidelines to arrange display board and to write report and journal.