



Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Endothermic Chemical Reaction To Make A Colder More Efficient And Affordable Ice Pack Making A Better More Efficient And Cheaper Cold Pack

Finalist's Name: Reuben Friedlander

School and City: Denver Jewish Day School

Sponsor's Name: Bethany Friedlander

Category: Chemistry (CHEM)

Division: Junior (6th - 8th grades)

Abstract (250 words or less):

People getting hurt is always a problem. During treatment, it is of the utmost importance to ensure no permanent damage will occur. Commonly, the medical field and individuals use cold packs that utilize ice or chemical reactions to generate subfreezing temperatures to stop swelling and keep medicine cold so it doesn't go bad. Commercially available ice packs become cold by utilizing endothermic reactions. The balance of the cost and efficacy of the chemicals is important when developing the packs. This study evaluated the efficacy of various chemicals to generate cold temperatures to optimize effect. In my experiment ratios of barium hydroxide with ammonium thiocyanate or barium hydroxide with ammonium chloride were picked. Temperature was recorded while in a polystyrene coffee cup calorimeter. Temperature was monitored using a digital thermometer until the coldest temperature was reached. The duration of the temperature was also recorded. I found that the coldest and longest-lasting ratio was 1:1. The most effective chemicals used were 3g of ammonium thiocyanate to 3g of barium hydroxide. It lasted for a time of 9 minutes and 4 seconds with a temperature of as low as -22.7°C. The other ratios I used included 1:2, 1:3, and 1:4. These ratios reached less cold temperatures. Endothermic reactions are very important in any society. To keep food cold or keep sports players safe. This experiment taught me many things such as what's a coffee cup calorimeter. What ice packs are used for commercial ice packs are charging over triple the amount of money for their ice packs.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature:

Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.