

# How Science Looks

## Summary

Students will investigate through an open inquiry lab to determine which mix of two chemicals creates the largest exothermic reaction. The students will be experimenting to make their own DIY hand warmers for a camping trip they are going on. The temperature of each hand warmer creation will be measured and then compared with and to class data.

## Additional Core Ties

Mathematics Grade 6

[Strand: STATISTICS AND PROBABILITY \(6.SP\) Standard 6.SP.5](#)

## Time Frame

1 class periods of 45 minutes each

## Group Size

Small Groups

## Materials

Local Grocery Store

:

- Vinegar
- Baking Soda
- Steel Wool
- Cotton Balls
- Yeast
- Ziploc Bags-Sandwich size
- Lemon Juice
- Water
- Hydrogen Peroxide

Walmart/Super Store

:

- Small Plastic Containers
- Reusable Hand Warmers (as a demo if students are unfamiliar with the concept)
- Small plastic cups (2-4oz)

Home Depot/Hardware Store

:

- Prestone driveway heat

Other Locations/Online/Catalog

- Thermometers

## Background for Teachers

- [Chemical Change](#)
- [Convection](#)
- [Conduction](#)
- [Radiation](#)

## Student Prior Knowledge

Students will need to describe the observable evidences of a chemical change. Also, students can practice basic lab safety and how to read a thermometer.

## Intended Learning Outcomes

1. Use Science Process and Thinking Skills

f. Plan and conduct simple experiments.

Intended Learning Outcome -- Linked to Standards

The students will synthesize chemical reactions that give off heat as an observable change. The heat produced from their reactions will then be transferred to the outside system, in this case, their hands and measured by a thermometer. Students will be able to analyze their results by an individual chart and graph, as well as a whole class data collection.

## Instructional Procedures

### Teacher Preparation

Purchase supplies.

Measure out the liquids (water, vinegar, lemon, etc.) into small 2 oz. cups for the students.

Measure out the solids (salt, sugar, etc.) into separate small 2 oz. cups for the students.

Place the supplies together and label each individually or with a big sign.

Here are the combinations that will work best. Do not share this information with the students.

Vinegar and Steel Wool

Hydrogen Peroxide and Yeast

Water with Prestone Driveway Heat

### Inquiry Lab

#### Set Up the Problem

Explain that the student and their family are going on a camping trip but all of the hand warmers are out of stock. You want to stay warm and so you need to create your own hand warmers. The goal of today is to create a reaction that gives off the most heat.

Explain to the students that they can use any of the set out materials but they can only use two at a time to mix and they only get three trials.

Pass out the "Hand Warmer Lab" paper and give them time to write their hypothesis and chosen materials they will use with their partner(s).

### Inquiry Lab

Let them mix their materials together two at a time. They will need to take the temperature right after they mix the substances together. They will then need to take the temperature every 20-30 seconds for 2 minutes. Students will record their data in the table.

They will find the difference by subtraction of the last temperature they collected minus the first temperature they took.

Repeat these steps for all three trials.

### Class Data Analysis

Once students have finished their temperature recordings, each group will show their biggest difference with the rest of the class in a class chart.

Take an average of this data and together as a class, discuss the data, what happened and why.

Students finish their conclusion questions and identify which mixture produced the largest amount of heat.

## Strategies for Diverse Learners

Calculators need to be available to those who need them. Also in the conclusions section pictures could

be used to help those who need language help.

### Extensions

#### 5th Grade

: You could try the experiment with endothermic reactions. You could compare them to physical changes you might have already covered. You could have them do a research project on fireworks.

6th Grade: You could have them look into other ways to heat objects. They could look into how to be more efficient with heating, or how to heat with the sun or in a third world country.

### Assessment Plan

Have them finish the conclusion section on the lab document.

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