Pouch Temperature Test

Use temperature data to design a warming or cooling pouch.

8.7 "Analyze data from an investigation to determine whether thermal energy is released or absorbed in a chemical reaction. a. Design and test a device that can release or absorb thermal energy by chemical reactions."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each temperature change in the passage, then circle the table values that support it. Number the safety concerns the team must address before testing a pouch.

A Pouch for the Bike Team

1 A bike team wants a small pouch that can warm a rider's hands or cool a sore ankle. They test two mixtures in open cups before choosing a design. Each cup starts at room temperature. They use the same thermometer and measure after two minutes. A third cup of water is stirred as a comparison.

2 In one cup, yeast helps break down household-strength hydrogen peroxide into water and oxygen gas. In another, baking soda reacts with vinegar and makes carbon dioxide gas. The team records the liquid temperatures in the table. A rise in the mixture's temperature is evidence that the reaction releases thermal energy. A drop suggests the reaction absorbs thermal energy.

LIQUID TEMPERATURES IN OPEN CUPS

Cup contents	Start (°C)	After 2 minutes (°C)
Stirred water	22	22
Hydrogen peroxide and yeast	22	25
Baking soda and vinegar	22	18

3 The team sketches a pouch with two chambers. Squeezing breaks an inner seal to mix the materials, but the outer pouch must resist leaks. Its surface should transfer heat without letting chemicals touch skin. Because both reactions make gas, trapped gas could swell or burst the pouch. The team must test temperature changes and check the pouch for leaks.

2 ANSWER WITH EVIDENCE

Use the passage

1. How much did the hydrogen peroxide mixture's temperature change? What does that change show about the reaction?

2. How much did the baking soda and vinegar mixture's temperature change? What does that change show about the reaction?

3. Which reaction produced the larger temperature change in this test? Use numbers from the table.

4. How does the stirred water result help the team interpret the two reaction results?

3 YOUR TURN

Your own words

Design a pouch for one of the bike team's needs. In four sentences, name the mixture, explain how your pouch mixes it while containing the gas and liquid, predict its temperature change using the table, and describe how you would test the pouch.

ANSWER KEY

Pouch Temperature Test

GRADE 8 · 8.7

PART 1 · READ AND MARK

Underline each temperature change in the passage, then circle the table values that support it. Number the safety concerns the team must address before testing a pouch. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How much did the hydrogen peroxide mixture's temperature change? What does that change show about the reaction?	**It rose 3°C, from 22°C to 25°C. The reaction released thermal energy.**
2	How much did the baking soda and vinegar mixture's temperature change? What does that change show about the reaction?	**It fell 4°C, from 22°C to 18°C. The reaction absorbed thermal energy.**
3	Which reaction produced the larger temperature change in this test? Use numbers from the table.	**Baking soda and vinegar produced the larger change: 4°C, compared with 3°C for hydrogen peroxide and yeast.**
4	How does the stirred water result help the team interpret the two reaction results?	**The water stayed at 22°C, so stirring alone did not cause a temperature change in this test.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

My cooling pouch for an ankle contains baking soda and vinegar in separate chambers. Pressing it breaks an inner seal, and the outer pouch has extra space for gas and keeps the liquid off skin. Based on the table, I predict its temperature will drop from 22°C to about 18°C after two minutes. I would check the pouch for leaks before filling it, then measure its temperature before mixing and after two minutes while watching for swelling.

Accept designs for either mixture if the predicted direction and size of the temperature change match the table. The design should keep chemicals off skin, allow space for gas, and include before-and-after temperature measurements.