Heat Up to Some Cool Reactions, Page 1 of 2

Every chemical reaction is accompanied by a change in temperature. Sometimes the change is barely noticeable and other times it's extreme. Sometimes the temperature goes up and other times it goes down. Try the two chemical reactions described in this activity to experience two different kinds of temperature changes

PART A

Materials:

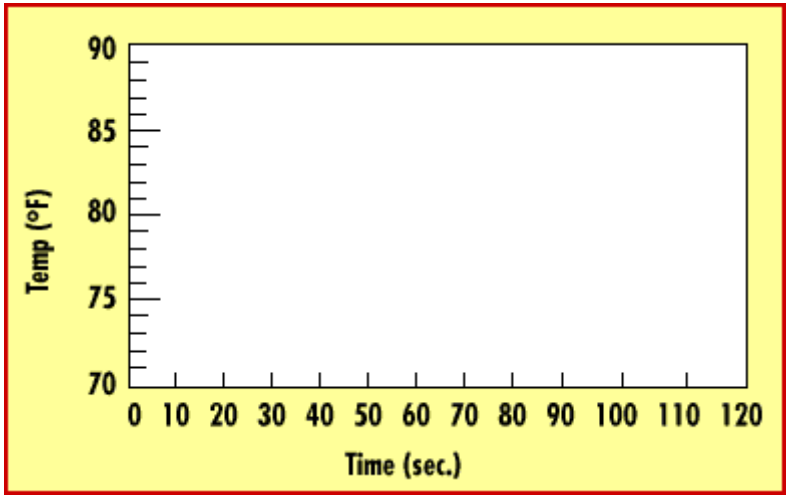
3% hydrogen peroxide (do not use a higher percentage)
Measuring spoons
Yeast (3 teaspoons)
Cup (paper or plastic)
Thermometer (use thermometers with red liquid only)
Watch (with a second hand)
Three people (at least)

Procedures:

1. Make a chart like the one below.

Time (sec.)	0	10	20	30	40	50	60	70	80	90	100	110	120
Temp (°F)													

2. Pour 2 tablespoons of hydrogen peroxide into a cup. Place the thermometer into the cup. Hold the thermometer and cup so they do not fall over. Read the temperature and record it in the chart under "Time 0".
3. Measure 1 teaspoon of yeast. Have one partner watch the thermometer and another look at the second hand on a watch.
4. Dump all the yeast into the cup. Gently swirl the cup while one partner calls out the time every 10 seconds. When each 10 seconds is called, another partner should call out the temperature. The third partner should record the temperature in the chart. What did you observe?
5. Make a graph like the one here. Use the information in your chart to graph your results. During what period of time did the temperature change the most? How about the least?



PART B

Materials:

Vinegar
Baking soda
Measuring spoons
Water
Cup (paper or plastic)
Thermometer (use thermometers with red liquid only)

Procedures:

1. Make a chart like the one below.

Time (sec.)	0	3	6	9	12	15	18	21	24	27	30
Temp (°F)											

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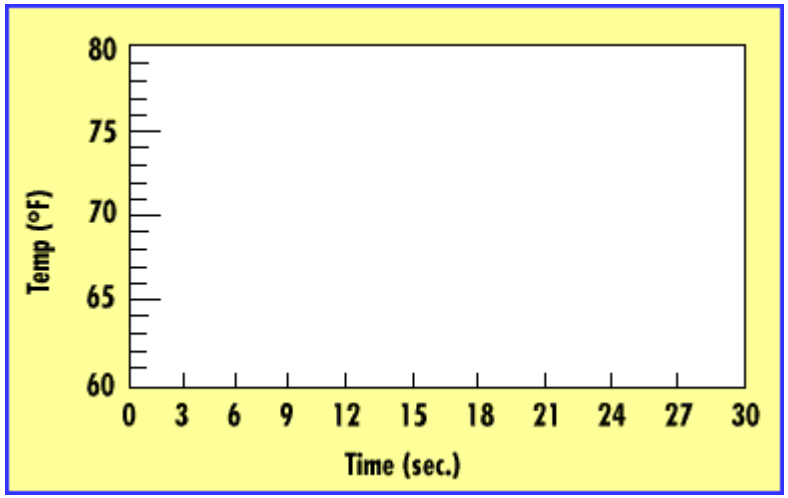
2. Place 2 tablespoons of vinegar in the cup. Put the thermometer in the cup. Hold the thermometer and cup so they do not fall over. Read the temperature and record it in the chart under "Time 0".
3. Measure 1 teaspoon of baking soda. Dump all the baking soda in the cup. Gently swirl the cup while one partner calls out the time every 3 seconds. When each 3 seconds is called, another partner should record the temperature in the chart. What did you observe?
4. Make a graph like the one below. Use the information on your chart to graph your results. During what period of time did the temperature change the most?



Where's the Chemistry?

In Part A of this activity, yeast was added to hydrogen peroxide. A chemical in the yeast causes a reaction in which the hydrogen peroxide breaks apart to form oxygen gas and water. It took energy to break the hydrogen peroxide apart and energy was released when the oxygen and water were formed. Since more energy was released in this reaction, the temperature went up. This reaction is called an *exothermic* reaction.

In Part B of this activity, baking soda was added to vinegar. Baking soda reacts with the vinegar to produce carbon dioxide gas, sodium acetate, and water. It took energy to break the baking soda and vinegar apart and energy was released when the carbon dioxide, sodium acetate, and water were formed. Since more energy was needed to break the baking soda and vinegar apart, the temperature went down. This reaction is called an *endothermic* reaction.

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The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

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Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

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