

# INV. 5 ACTIVITY—BAKING SODA AND BAKING POWDER

**Focus Questions: How is baking soda and baking powder the same? How are they different? How do they react in water?**

Baking soda and baking powder are common kitchen ingredients. They sound like they are the same, but they are different. Find out what substances are in baking soda and in baking powder (how are they same and different). Then do this activity to see how the two materials interact with water.

## Materials

- Baking soda
- Baking powder
- 3 drinking glasses (clear if possible)
- Teaspoon
- Ice water
- Room-temperature water
- Hot water

## Instructions

1. Collect the materials for this investigation and set up a data table in your science notebook. It could look something like this.

Water Temperature	Baking Soda	Baking Powder
Ice water		
Room-temperature water		
Hot Water		

2. Fill each drinking glass with a different temperature water: ice water, room-temperature water, and hot water.
3. Add 1 teaspoonful of baking soda to each glass and observe. Record your observations.
4. Dump the solutions into the sink and rinse out the glasses.
5. Re-fill the glasses with ice water, room-temperature, and hot water.
6. Add 1 teaspoonful of baking powder to each glass and observe. Record your observations in your table.
7. How does baking soda interact with water at different water temperatures?  
How does baking powder interact with water at different water temperatures?  
How do the substances compare?  
Does baking soda and baking powder interact in water the same way?  
Does water temperature make a difference in how the substance interact?

# INV. 5 ACTIVITY—COMPARE COOKIE RECIPES

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**Focus Question: Which chocolate chip cookie is better, one baked with baking soda or one baked with baking powder?**

Compare how chocolate chip cookies look and taste when you use either baking soda vs. baking powder in the cookie recipe. Be sure to bake your cookies with adult supervision.

## Materials

- Chocolate chip recipe (see recipe below for ingredients needed to make the cookies)

## Instruction

1. Follow the recipe and make two batches of cookie dough.  
In the first batch use baking soda as the recipe states.  
In the second batch, substitute baking powder for the baking soda.
2. Bake the two batches of cookie dough according to the recipe (see below).
3. How do the cookies compare after baking?  
Record your observations in your science notebook.
4. How do the cookies taste after baking? Record these observations.
5. Which ingredient do you prefer in your cookies (baking soda or baking powder?)

## CHOCOLATE CHIP COOKIE RECIPE

### Ingredients

2 ¼ cups all-purpose flour	¾ cup granulated sugar
1 tsp baking soda	¾ cup packed brown sugar
1 tsp salt	1 tsp vanilla extract
1 cup butter, softened	2 large eggs
	2 cups semi-sweet chocolate chips

### Directions

1. Preheat oven to 375°F.
2. Combine flour, baking soda (use baking powder for batch 2), and salt in small bowl. Beat butter, granulated sugar, and vanilla extract in large mixer bowl until creamy. Add eggs, one at a time, beating well after each addition. Gradually beat in flour mixture. Stir in chocolate chips. Drop by rounded tablespoon onto ungreased baking sheets.
3. Bake for 9–11 minutes or until golden brown. Cool on baking sheets for 2 minutes; remove to wire racks to cool completely.

# INV. 5 ACTIVITY—VINEGAR REACTIONS

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## Focus Question: What happens when you add vinegar to baking soda?

We've been investigating chemical reactions in class. We saw that mixing baking soda and citric acid in water produces a chemical reaction. Combining baking soda with an acid in liquid creates a chemical reaction. Vinegar is also an acid. What do you think will happen when you add vinegar to baking soda?

### Materials

- Hard-boiled eggs
- Food coloring (bright colors work best)
- Baking soda
- Water
- Vinegar
- Cotton swabs or paint brushes
- Small containers or cups to mix colors
- Bowl (large enough to hold a few eggs)

### Instructions

1. Hard boil some eggs. Dry them and let them cool.
2. Gather enough small containers for your colors. You'll need one container for each different color you wish to use on your eggs.
3. Add 1 heaping teaspoonful of baking soda to each container.
4. Add a little bit of water to the baking soda and mix to make a thick paste. If all of the baking soda doesn't mix into the paste, add a little more water. If your paste is really runny, add a bit more baking soda.
5. Add food coloring to the paste. If you have liquid food coloring, start with 6–10 drops. If you have gel food coloring, use a small squirt. Mix into the paste. Add more food coloring for a more intense color. **Be careful not to get paste on your clothes.**
6. Use the cotton swabs or paint brushes to paint the paste onto your egg. Create a pattern or picture in different colors. (Be careful not to get paste on your clothes.)
7. Once you've finished your design on your egg, let it set for a couple of minutes.
8. Fill the bowl at least half-full with vinegar.
9. Carefully lower your egg into the vinegar. What happens?
10. Rotate the egg in the vinegar so that all surfaces interact with the vinegar.
11. When the reaction stops, carefully remove the egg and let it dry on a paper towel.

Why do you think the reaction between the vinegar and baking soda paste happened? Why did you get a colored pattern on your egg after the reaction took place?

**Respond to the focus question in your notebook.**

# INV. 5 ACTIVITY—REACTION MEDIA RESOURCES

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**Online Resources on FOSSweb** (Must log in to FOSSweb with username and password.)

Use these online resources to help review content from **Investigation 5 of Mixtures and Solutions**. The tutorials and virtual investigations provide interactive resources that review concepts from the FOSS active investigations. The virtual investigations often mimic the active investigations that were done in class.

For the articles in *FOSS Science Resources*, access the interactive eBook and make sure to click on the interactive links within the readings. Be sure to take notes on what you learn from all online resources and answer the questions from the articles in your science notebook.

## Investigation 5 Resources

### Online Activities

- Fizz Quiz
- Tutorial—Reaction or Not?

### Media Library

#### • eBook readings (Interactive eBook)

- Ask a Chemist
- When Substances Change
- Air Bags

#### • Streaming Video

- *Chemical Reactions*
- *Changes in Properties of Matter*