



Rising Reactions

Baking soda and baking powder are both leaveners. A leavener is a substance or process that forms bubbles during baking, causing the food to puff up and rise. Other common leaveners found in baked goods are yeast and beaten air.

While they have similar names and even look alike, baking soda and baking powder contain different chemicals and therefore act differently. Baking soda is simply sodium bicarbonate. Baking powder, on the other hand, is sodium bicarbonate *plus* an acid and other ingredients, usually cream of tartar and starch.

Since baking soda does not contain its own acid, it must be combined with moisture and something acidic (like vinegar or lemon juice) for it to properly react and help the baked good rise. Baking powder already contains its own acid, so it only needs moisture to react.

Materials needed:

- Tape
- Baking sheet
- Baking soda
- Baking powder
- Water
- Vinegar
- Red cabbage (optional)
- Pot for boiling water (optional)

Step-by-step instructions:

1. Tape the baking sheet into 4 sections.
2. Label the sections as follows:
 - A: Baking soda + Water
 - B: Baking powder + Water
 - C: Baking soda + Vinegar
 - D: Baking powder + Vinegar
3. Measure 1 tbsp. of baking soda into the sections A and C.
4. Measure 1 tbsp. of baking powder into the sections B and D.
5. Pour 1 tsp. of water onto the pile of powder in sections A and B.
6. Pour 1 tsp. of vinegar onto the pile of powder in sections C and D.
7. Observe each chemical reaction and take notes.

Rising Reactions (continued)

Additional explorations:

Chemical indicators are a tool scientists use to test whether or not something is present in a substance. You can use an indicator made of red cabbage leaves to test for the presence of acids!

To make the indicator:

1. Chop up 1/4 of a red cabbage.
2. Place chopped leaves into a pot with 3 cups of water.
3. Place pot on the stove and simmer until water turns purple.
4. Remove cabbage leaves and allow the purple liquid to cool.
5. Pour the purple liquid into a jar or other container and label it (so no one drinks it by accident!).

Now, use this indicator to test the baking soda and baking powder:

1. Pour a small amount of the indicator into two clear glasses.
2. Add 1 tbsp. of baking soda to one cup of indicator.
3. Add 1 tbsp. of baking powder to the other cup of indicator.
4. Make observations about the color of each liquid. Use the chart below to determine which substance contained an acid:

pH	pH less than 7 = Acid			pH more than 7 = Base		
	2	4	6	8	10	12
Color						
	Red	Purple	Violet	Blue	Blue-Green	Green-Yellow

Discussion questions:

- Can you tell the difference between the powders by using your senses? How?
- What do you notice when you add water to each of the powders?
- What do you notice when you add vinegar to each of the powders?
- Take a look at the ingredients on each of the containers that you took each powder from. What do you notice?
- What other powders in your kitchen can you test with the cabbage indicator? What do you think you'll discover?

Additional resources:

Learn more about baking soda and baking powder here:

<https://www.bobsredmill.com/blog/recipes/baking-powder-vs-baking-soda/>