

Cookie Experiment:

Baking Soda Vs. Baking Powder

Did you know baking involves science? Do you wonder when you and your family bake, why some recipes involve using baking soda or baking powder? Is there a difference? Try conducting this experiment to identify the similarity and differences in the cookies and decide which one you like better.



In this experiment, we will be using a sugar cookie recipe found online to make a small batch of each. First, let us hypothesize. With your knowledge of baking soda and baking powder, what do you think the difference is? Use this table to fill out what you think there is a difference is.

Differences in using Baking Soda and Powder Hypothesis		
Texture	Yes	No
Color	Yes	No
Taste	Yes	No
The spread of the cookie	Yes	No
Favorite Cookie	Baking Soda	Baking Powder
Hypothesis:		

Let's start the experiment! For this experiment, we are using a sugar cookie recipe found online. After making the cookies try them out.

Ingredients

- 4 tablespoons unsalted butter, melted
- 1/3 cup granulated sugar
- 1 large egg yolk, white reserved for another use
- 1/2 teaspoon vanilla extract



- 1/2 cup + 2 tablespoons all-purpose flour
- 1/4 teaspoon baking soda or 1 teaspoon of baking powder
- 1/8 teaspoon fine salt

Instructions

1. Preheat the oven to 350, and line a small baking sheet with parchment paper (or use a silicone mat).
2. Stir together the melted butter, sugar, egg yolk, and vanilla extract. Stir very well to combine.
3. Next, sprinkle the flour, baking soda and salt evenly over the dough, and stir just to combine.
4. Press the dough flat and evenly in the bowl, and then divide it in half. You should get 3 cookies from each half.
5. Roll each dough ball in your hands, roll lightly in extra granulated sugar, and then space evenly on the prepared baking sheet.
6. Bake for 10-12 minutes, until they spread, start to crack and appear dry on top.
7. Let the cookies rest on the baking sheet for 2 minutes before moving them to a wire rack to cool completely.
8. Bring to room temperature before serving.

Now try your cookies and fill out the table. Add comments of your findings when tasting the two cookies. Look at the “Science behind it” section to learn about what to expect during this experiment when using baking soda or baking powder to make the cookies.

Differences in using Baking Soda and Powder			
Texture	Yes	No	Comments:
Color	Yes	No	Comments:
Taste	Yes	No	Comments:
The spread of the cookie	Yes	No	Comments:
Favorite Cookie	Baking Soda	Baking Powder	Comments:
Did you reject or accept your hypothesis?			



The Science Behind it:

Baking soda and baking powder are both leavening agents that determine the spread, rise, texture, and browning of cookies. They are similar but have some differences.

Baking soda (Sodium bicarbonate) is a base and an acid must be added to react with the baking soda to create carbon dioxide for the cookies to rise. The acid in this case is brown sugar. If baking soda is not added to the recipe, it will cause the cookies to fall flat and not cook properly. If too much baking soda is added and not enough acid is added it will cause an off flavor such as a metallic or soapy taste. If the baking soda was omitted during the baking process, it will cause the cookies to fall flat and not cook properly. The result of the cookies when using baking soda is a standard chewy and crisp cookie, average amount of spread and a bit of lift.

The baking powder contains an acid and a base. The base is the baking soda (sodium bicarbonate) and the acid is the cream of tartar to make baking powder. There are two different types of baking powder, single and double acting.

Single acting requires moisture to be activated, once it comes in contact with moisture, the cookies must be cooked immediately after mixing while double acting allows the dough to sit out longer before baking. Most baking powders are double acting and is most often used when a recipe does not call for an additional acidic ingredient. The double acting powder undergoes two phases of activation. The first leavening occurs when baking powder gets wet and the second leavening occurs when it is heated.

Using single acting baking powder results in a puffy and cakey texture to the cookies and they are not as chewy. When using double acting baking powder, the cookies do not spread out as much during baking, pale, cakey, and not as chewy.



Try it out with your family and friends by masking the two cookies. Have them taste it to see if they can tell the differences between the two and which one, they prefer more. This experiment can also be done with chocolate chip cookies or other cookie recipes by making the needed substitutions.



Resources:

- <https://www.bobsredmill.com/blog/recipes/baking-powder-vs-baking-soda/>
- <https://www.buzzfeed.com/jesseszewczyk/baking-soda-or-powder-cookie-baking-test>
- https://www.sciencebuddies.org/science-fair-projects/project-ideas/FoodSci_p014/cooking-food-science/how-do-you-make-the-best-cookie#materials

