

Kaylee Beemans Recipe

Better Than Boxed Brownies?



Ready in 27 minutes

Serves 9 people

Ingredients

¾ cup butter

¾ cup flour

1 cup white sugar

2 eggs

1 teaspoon vanilla

¼ teaspoon of salt

⅓ cup unsweetened cocoa powder

1 teaspoon baking powder / baking soda

Experiment:

Have you ever wondered why some recipes call for baking soda and others call for baking powder? Well, I did, and that is why for my experiment I wanted to get down to the bottom of why. I decided I wanted to bake one of my favorite desserts, brownies, and put baking soda in one batch of brownies and put baking powder in the other to see how the results differed. I made my family's recipe and followed it all the way through except I didn't add all of the special ingredients that we usually include so it was just like any other normal brownie recipe. I used the same amount of leavener for each batch. That is why we add baking soda and baking powder when in the process of baking. It is because when these two different leaveners combine with something like water or an acid and react to make carbon dioxide bubbles, otherwise known as air bubbles. In order to answer my question of which leavener works the best I needed to find out which leavener would make the fluffiest and/or the tallest brownies. When doing my research I found that baking powder consists of an acid and a base that don't react with each other until they are mixed with another component. But baking soda is only a base which needs an acid to react with in order to make any carbon dioxide in the baking process. I did not add an acid to the brownies that contained baking soda when doing my project because I was unsure of how much to add. This is why my experiment wasn't very equipped and my overall results weren't very comparable. It was pretty obvious in the end what brownies were more fluffy and why. Obviously the brownies containing baking powder were the fluffiest. I will further explain my process in results to this brownie baking experiment.



Process- Batch A

1. Preheat oven to 350 degrees
2. Put $\frac{3}{4}$ cup of butter in microwave or pot and heat till liquified
3. Gather two mixing bowls and transfer the butter into one of the bowls
4. Add a teaspoon of salt to the butter, mix thoroughly and set aside
5. Put $\frac{1}{2}$ cup of unsweetened cocoa powder in other bowl and crack 2 eggs, mix together with whisk
6. Add $\frac{3}{4}$ cup of flour to the bowl with cocoa powder, 1 cup of sugar and 1 teaspoon of vanilla in the same bowl
7. Finally add 1 teaspoon of baking powder into the bowl containing the cocoa powder
8. Mix the contents of the two bowls together and whisk until there are no clumps left
9. Then pour the mixture into an 8 x 8 pan (most preferred clear for easy measurement in height)
10. Place in oven and bake for 25-30 minutes (it took me 27 minutes)

Process- Batch B

1. Preheat oven to 350 degree
2. Put $\frac{3}{4}$ cup of butter in microwave or pot and heat till liquified
3. Gather two mixing bowls and transfer the butter into one of the bowls
4. Add a teaspoon of salt to the butter thoroughly and set aside
5. Put $\frac{1}{2}$ cup of unsweetened cocoa powder in other bowl and crack 2 eggs, mix thoroughly with whisk
6. Add $\frac{3}{4}$ cup of flour to the bowl with cocoa powder, 1 cup of sugar and 1 teaspoon of vanilla in the same bowl
7. Finally add 1 teaspoon of baking soda into the bowl containing the cocoa powder
8. Mix the contents of the two bowls together and whisk until there are no clumps lefts
9. Then pour the mixture into an 8 x 8 pan (most preferred clear for easy measurement in height)
10. Place in oven and bake for 25-30 minutes (it took me 27 minutes)

Survey Results:

I gave a blind taste test to 12 individuals and conducted a small survey to see which brownie they thought was the fluffiest. The first question that was asked was, "How fluffy did you think that 'Brownie A' was (1 being not fluffy at all and 5 eating a cloud)?" A little less than 60% of people said that Brownie A was a 4 on the fluffiness scale. I asked the same question for Brownie B and I recieved a little more than 65% saying that it was a 1 on the fluffiness scale. I asked several other quantitative and qualitative questions that all led me to my final conclusion that Brownie B was obviously less fluffy then Brownie A.

The Final Results:

My final results concluded with a large amount of differences in both types of brownies. Appearance wise, Brownie A was definitely more appealing, for they looked like more normal brownies. They were a medium color brown and measured roughly 1.5 inches on the sides and a little more than half an inch in the center. Whereas Brownie B wasn't as appealing. They were very dark, very thin and very deflated. They measured about 2 inches on the side and almost exactly a quarter of an inch in the middle. They both tasted fairly salty but Brownie A was clearly the fluffiest brownie and overall the better tasting brownie. Now you might be thinking obviously Brownie A was fluffier because it had an acid to react to and Brownie B did not. I didn't add an acid to the mixture for the reaction to occur because I was unsure of how much to add. When diving deeper into what went wrong in this project I found the ratio of baking soda and the acid most commonly found in baking powder which was cream of tartar. I found that the ratio was a 5:2 ratio. This would be the same as saying 5 teaspoons of cream of tartar and 2 teaspoons of baking soda. In order to do the math to figure out how much CO_2 baking powder and baking make it took a lot of work. I first started with baking soda in which I balanced its chemical equation, looked up the density and mass and converted to molecules. But when I tried to follow those same steps for baking powder I found it to be more troubling. I balanced the chemical equation and found the density and mass of baking powder but when trying to convert to molecules of carbon dioxide released, it wasn't very simple. I found out that baking powder's acid to base ratio is a 5:2 ratio which is equivalent to 5 teaspoons of cream of tartar and 2 teaspoons of baking soda. Cream of tartar is a lot stronger than what was expected. This being said, it is better to have more of a base than an acid because the base by itself is able to decompose into a gaseous state but the acid is not able to do so. The gas that is created contains both water and carbon dioxide.

Self Assessment:

Overall I think the thought of my experiment was great but when it came to executing the plan, I didn't do so well. I had never made homemade brownies by myself before, much less my family's recipe. Although I didn't exactly get the results I wanted and my brownies taste salty, I think that my project could be greatly executed in the future and that I could then actually compare my results.

The Science:

As I previously mentioned, my results were not exactly very comparable. When I took the first batch of brownies out, "Batch A", they looked and smelt like normal brownies. But when I took out the second batch, "Batch B", they did not look like normal. Batch A was lighter than the other brownies but it went from light in the middle and slowly got darker when getting toward the edge of the pan. They were moist but mainly just fluffy and were fairly salty. This may have been because the recipe I used was a family recipe that consists of other "special ingredients" I thought would not be necessary. They ended up being a lot of the recipes source of sweetness. When I took out the second batch it was not even a brownie. The ends were fairly foldable and the brownie was pretty moist but the batch was basically a pit and the center was completely flat. Batch B was also darker, way saltier and wasn't fluffy at all. As I mentioned before, this is because I did not add an acid to Batch B and so the baking soda had nothing to react to. There was then no carbon dioxide made and the brownies did not rise. If I were to do this project again I would add lemon juice as my acid. When doing my research I found that lemon juice and baking powder have the same amount of acid in them. This then causes me to believe that if there is the same amount of base and the same amount of acid in each one of the batches, that there will be no difference in how much carbon dioxide is released. Tastewise, if I would have gone with a different recipe and followed the recipe completely then maybe they would taste better. Even just adding more sugar or vanilla could really help decrease the saltiness and increase the sweetness of each of the brownies.

