

Bake a Chemistry Cake

Names _____

Food Science, _____/20 points possible



Purpose:

Is baking a cake a chemical change? Next time you bake a cake, think about this: The cake dough isn't really a cake, but when it's heated in the oven, a chemical reaction occurs and new bonds are formed. How does heat change things? It creates chemical reactions. When it comes to heat and baking, there are two types of chemical reactions to consider; one is "**exothermic**," a reaction that **produces heat**, and the other is "**endothermic**," a reaction that **takes heat in**. As you bake a cake, you are producing an endothermic chemical reaction that changes batter into a fluffy, delicious dessert! A few things can happen when you bake a cake. Some chemical reactions to keep in mind while doing this experiment are:

- Heat helps baking powder produce tiny bubbles of gas, which makes the cake light and fluffy.
- Heat causes protein from the egg to change and make the cake firm.
- Fat keeps the heat from drying out the cake.

Equipment Needed:

- Medium bowl
- Small Bowl
- Cupcake pan
- Muffin Liners
- Measuring cups
- Measuring spoons
- Index card or Post-It for Labeling
- Pencil

Ingredients for one cake:

1 cup white sugar
1/2 cup butter (8 tablespoons)
2 eggs
2 teaspoons vanilla extract
1 ½ cups AP flour
1 ¾ teaspoon baking powder
4 fluid ounces milk

Procedure:

1. Preheat oven to 350 degrees F (175 degrees C). Line muffin pan with paper liners.

2. INSTRUCTIONS FOR CONTROL VERSION

(Note: Follow the instructions making modifications as necessary as deemed in the version assigned to your group)

In a medium bowl, cream together the sugar and **butter**. Beat in the **eggs**, one at a time, then stir in the vanilla. Combine flour and **baking powder**, add to the creamed mixture and mix well. Finally stir in the milk until batter is smooth. Pour or spoon batter evenly into the 12 muffin cups.

- **Group 1:** Leave the butter out (**Variation 1**)
- **Group 2:** Leave the eggs out (**Variation 2**)
- **Group 3:** Leave the baking powder out (**Variation 3**)
- **Group 4:** Prepare the recipe exactly as is (**CONTROL**)

3. Bake for 20 to 25 minutes. Cupcakes are done when they spring back to the touch or when a toothpick is inserted in the center and comes out clean.

2. After baking, cut each cupcake in half and examine each of the 3 variations vs. the control cupcake.

Complete the chart below:

Variation	Description of Texture	Description of Flavor	Description of Cell Uniformity	Scale of 1-5 on overall acceptability (1 lowest rating, 5 highest rating)
1 (No butter)				
2 (No eggs)				
3 (No baking powder)				
4 (Control)				

Other comments or observations:

Conclusion:

Describe the chemical changes that did and/or did not occur within the cakes prepared. What did you learn about chemical changes that occur within baking?

(Answer in 4-6 sentences on another sheet of paper and staple to this form)

Sources:

Danyali, Alicia. "Bake a Chemistry Cake." *Chemistry of Baking*. Education.com, 26 Mar. 2014. Web. 21 Oct. 2014.
Osman, Scott. "Simple White Cake." *Allrecipes.com*. Allrecipes.com, n.d. Web. 21 Oct. 2014.