Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*No more than two people working together.*

Creative Chef

**Leavening Agents Lab**

**Objective:** The students will understand which chemical reactions occur that cause baked goods to rise. By gaining this knowledge, the students will be able to predict what will happen when a recipe is followed. The students will learn to expect the same results repeatedly if they measure accurately and follow the procedures for the recipe exactly. The students will apply the concept of leavening agents across various recipes, replicating results in each recipe. The students will transfer results from scientific experimentation to food preparation. From this experience the students will know the scientific nomenclature for the reactions of baking soda, baking powder and yeast, and be able to apply this knowledge in the production of baked goods.

1. **Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will happen because**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Procedure:**

* Measure 8 ounces of 80 - 90 degree water into a small bowl.
* Add 1 teaspoon of baking powder. Stir.
* Observe. Record results below.
1. **Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will happen because**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Procedure:**

* Measure 8 ounces of 80-90 degree water into a small bowl.
* Add 1 teaspoon of baking powder. And 1 teaspoon vinegar. Stir.
* Observe. Record results below.
1. **Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will happen because**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Procedure:**

* Measure 8 ounces of 80-90 degree water into a small bowl.
* Add 1 teaspoon of baking soda. Stir.
* Observe. Record results below.
1. **Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will happen because**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Procedure:**

* Measure 8 ounces of 80-90 degree water and 1 tablespoon vinegar into a small bowl.
* Add 1 teaspoon of baking soda. Stir.
* Observe. Record results below.
1. **Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will happen because**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Procedure:**

* Measure 8 ounces of ice cold water into a small bowl.
* Add 1 teaspoon of yeast. Stir.
* Observe. Record results below.
1. **Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will happen because**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Procedure:**

* Measure 8 ounces of 80 - 90 degrees water into a small bowl.
* Add 1 teaspoon of yeast. Stir.
* Observe. Record results below.
1. **Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will happen because**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Procedure:**

* Measure 8 ounces of water into a 2 cup liquid measuring cup.
* Bring to a boil in the microwave. Remove from microwave.
* Add 1 teaspoon of yeast. Stir.
* Observe. Record results below.
1. **Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will happen because**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Procedure:**

* Measure 8 ounces of 80 - 90 degrees water into a small bowl.
* Add 1 teaspoon of yeast. Add 1 teaspoon sugar. Stir.
* Observe. Record results below.
1. **Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will happen because**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Procedure:**

* Measure 8 ounces of 80 - 90 degrees water into a small bowl.
* Add 1 teaspoon of yeast. Add 1 teaspoon sugar. Add 1 teaspoon salt. Stir.
* Observe. Record results below.

**Data: Variable Observations**

|  |  |  |
| --- | --- | --- |
| 1. **Baking Powder**
 | **Water** |  |
| 1. **Baking Powder**
 | **Water; vinegar** |  |
| 1. **Baking soda**
 | **Water** |  |
| 1. **Baking soda**
 | **Water; vinegar** |  |
| 1. **Yeast**
 | **Ice water** |  |
| 1. **Yeast**
 | **Warm water** |  |
| 1. **Yeast**
 | **Boiling water** |  |
| 1. **Yeast**
 | **Water and sugar** |  |
| 1. **Yeast**
 | **Water, sugar, and salt** |  |

**Analyze:**

1. What patterns do you notice in the baking soda experiments? How were they different from the other leavening agents?
2. What patterns do you notice in the baking powder experiments? How were they different from the other leavening agents?
3. What patterns do you notice in the yeast experiments? How were they different the other leavening agents?

Conclusion:

My hypothesis was (circle one) supported or not supported because

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_­­­­­­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_.

 **Follow-Up questions:**

1. What did you notice happening when all of the leavening agents were “working”? How might this allow a baked good to rise?
2. If you have a recipe that uses yeast, what would be required for the baked good to rise, based on your experiments?
3. If you have a recipe with an acidic ingredient (like vinegar or buttermilk), what might be a good leavening agent to result in a good rise?
4. If you want a baked good that uses baking powder to rise, what conditions should be present, based on your experiments?
5. Read the recipe below:

**Chocolate Chip Cookies with Yeast**

**Ingredients**

* 1 stick butter
* ¾ cup brown sugar
* ½ cup sugar
* 1 egg
* 2 tsp vanilla
* ¼ cup coconut oil
* 2 cups flour
* ¾ tsp baking soda
* 1 tsp yeast
* ½ tsp salt
* 1 package chocolate chips

**Instructions**

1. In a small saucepan, melt the butter and then swirl it until it browns (watch it closely so it doesn’t burn!).
2. Combine the butter with the sugars and mix with a mixer.
3. Add the coconut oil, egg and vanilla and continue to mix.
4. Combine the dry ingredients in another bowl and add gradually to the butter mixture.
5. Stir in the chocolate chips.
6. Refrigerate 30 minutes. Meanwhile, preheat the oven to 375 degrees. Scoop out large (like ¼ cup or giant ice cream scoop sized) mounds of cookie dough onto a cookie sheet. Press down slightly and bake 10 -14 minutes.

6).What are the leavening agents in this recipe?

7.) Is each a chemical or natural leavener?

* 1. How are these leaveners activated?