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. **Baking Powder and Warm Water:**

Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think

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

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

**Procedure:**

* Measure 50 ml of warm water into a small bowl.
* Add 5 ml of baking powder. Stir.
* Observe. Record results in the chart.

1. **Baking Powder, Warm Water & Vinegar:**

Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think

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

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

**Procedure:**

* Measure 50 ml of warm water into a small bowl.
* Add 5 ml of baking powder. And 5 ml vinegar. Stir.
* Observe. Record results in the chart.

1. **Warm Water and Baking Soda**

Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think

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

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

**Procedure:**

* Measure 50 ml of warm water into a small bowl.
* Add 5 ml of baking soda. Stir.
* Observe. Record results in the chart.

1. **Warm Water, Baking Soda, and Vinegar**

Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think

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

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

**Procedure:**

* Measure 50 ml of warm water and 15 ml vinegar into a small bowl.
* Add 5 ml of baking soda. Stir.
* Observe. Record results in the chart.

1. **Cold Water and yeast**

Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think

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

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

**Procedure:**

* Measure 50 ml of ice-cold water into a small bowl.
* Add 5 ml of yeast. Stir.
* Observe. Record results in the chart.

1. **Warm Water and Yeast:**

Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think

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

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

**Procedure:**

* Measure 50 ml of warm water into a small bowl.
* Add 5 ml of yeast. Stir.
* Observe. Record results in the chart.

1. **Hot Water and Yeast:**

Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think

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

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

**Procedure:**

* Measure 50 ml of water into a 500 ml liquid measuring cup.
* Bring to a boil in the microwave. Remove from microwave.
* Add 5 ml of yeast. Stir.
* Observe. Record results in the chart.

1. **Warm Water, Yeast, and Sugar:**

Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think

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

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

**Procedure:**

* Measure 50 ml of warm water into a small bowl.
* Add 5 ml of yeast. Add 5 ml sugar. Stir.
* Observe. Record results in the chart.

1. **Warm Water, Yeast, Sugar, and Salt:**

Hypothesis: If I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then I think

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

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

**Procedure:**

* Measure 50 ml of warm water into a small bowl.
* Add 5 ml of yeast. Add 5 ml sugar. Add 5 ml salt. Stir.
* Observe. Record results in the chart.

**Data: Variable Observations**

|  |  |  |
| --- | --- | --- |
| 1. **Baking Powder** | **Water** |  |
| 1. **Baking Powder** | **Water and vinegar** |  |
| 1. **Baking soda** | **Water** |  |
| 1. **Baking soda** | **Water and vinegar** |  |
| 1. **Yeast** | **Cold water** |  |
| 1. **Yeast** | **Warm water** |  |
| 1. **Yeast** | **Boiling water** |  |
| 1. **Yeast** | **Warm water and sugar** |  |
| 1. **Yeast** | **Warm 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 hypotheses were (circle one) supported or not supported because

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

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**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?