



Grade Level: 4 - 12

Essential Skills: 1, 3, 4, 5

NGSS: 3-LS3-2, 5-PS1-1, MS-LS1-5, HS-LS1, HS-LS2

CCSS: RI.4.3, RI.4.4, RI.4.7, RI.5.1, RI.6.1

Time: 30 minutes

Materials:

- 3 125-mL Erlenmeyer flasks
- water
- hot plate or thermos
- 1 1/2 tsp flour
- 1 1/2 tsp sugar
- 3 tsp yeast
- 3 or more balloons

AITC Library Resources:

Check out these materials online at AITC's [Lending Library](#):

Books:

- Bread, Bread, Bread*
- Everybody Bakes Bread*
- Bread Comes to Life - A Garden of Wheat and a Loaf to Eat DVD*
- Bread is for Eating*
- Grains to Bread - Welcome Books*
- Science in Your Shopping Cart*

More Activities:

- Bread in a Bag*
- Microbe Observations Lesson*

Lesson to Grow

Yeast Blowup!

Description:

This lesson demonstrates the fact that yeast are actually tiny living, breathing microorganisms. We can see holes in bread, but how did they get there? When yeast is mixed with flour, each bit of yeast eats the sugar, and releases carbon dioxide gas before it gets baked. Yeast dies during the baking process and leaves all of those tiny holes, giving bread its structure and texture.



Directions:

- 1) In three 125-mL Erlenmeyer flasks, place 1/2 teaspoon of flour, 1/2 teaspoon of sugar, and 1 teaspoon yeast.
- 2) In the first flask, add cold tap water to the 100 ml mark (the water temperature should be 60 degrees Fahrenheit, 15 degrees Celsius). In the second flask, add warm water to the 100 ml mark (the water temperature should be 100 degrees Fahrenheit, 38 degrees Celsius). In the third flask, add boiling water to the 100 ml mark (212 degrees Fahrenheit, 100 degrees Celsius). Swirl the flasks.
- 3) Place a balloon over each flask. Three different colors helps for identification.

Observations:

- a. What do you observe in the first 5 minutes?
- b. What do you observe in 20 minutes?
- c. What do you observe in 60 minutes?
- d. What is blowing up the balloons? (carbon dioxide gas from yeast respiration).
- e. Which flask had the best temperature? Why?
- f. What do you think would happen if twice the sugar was added? How about half as much?
- g. Yeast added to bread dough. Why does the bread rise?
- h. Will temperature affect how quickly bread will rise?
- i. Can you see evidence of carbon dioxide bubbles in bread?
- j. If you add more yeast to bread, will it rise faster?

Variations:

Vary the sugar, substitute whole wheat flour, use no flour, no sugar, heat the flask containing the cold water, test quick-rising yeast versus standard bread yeast, etc.

Discussion Questions:

Is yeast alive? (Yes, yeasts are single-celled microorganisms classified in the kingdom Fungi.)

What does yeast need to live? They are chemoorganotrophs, using organic compounds or sugars as energy sources, and do not require sunlight to grow.

How does yeast help bread rise? The yeasts convert sugar from the flour into carbon dioxide and alcohol. Yeast begin this process, known as **fermentation**, once bread dough is mixed. The longer the bread is allowed to rise, the greater the flavor of the bread.



Yeast Blowup!

Student Name: _____

Part I: Preparing Yeast Samples

- 1) In three 125-mL Erlenmeyer flasks, place 1/2 teaspoon of flour, 1/2 teaspoon of sugar, and 1 teaspoon yeast.
- 2) In the first flask, add cold tap water to the 100 ml mark (the water temperature should be 60 degrees Fahrenheit, 15 degrees Celsius).
- 3) In the second flask, add warm water to the 100 ml mark (the water temperature should be 100 degrees Fahrenheit, 38 degrees Celsius).
- 4) In the third flask, add boiling water to the 100 ml mark (212 degrees Fahrenheit, 100 degrees Celsius). Swirl the flasks.
- 5) Place a balloon over each flask. Three different colors helps for identification.

Part II: Observations

1. What do you observe in the first 5 minutes?

2. What do you observe in 20 minutes?

3. What do you observe in 60 minutes?

4. What is blowing up the balloons?

5. Which flask had the best temperature? Why?

6. What do you think would happen if twice the sugar was added? How about half as much?

7. Yeast added to bread dough. Why does the bread rise?

8. Will temperature affect how quickly bread will rise?

9. Can you see evidence of carbon dioxide bubbles in bread?

10. If you add more yeast to bread, will it rise faster?