



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!

Nombre del estudiante: _____

Parte I: Preparación de muestras de levadura

- 1) En tres matraces Erlenmeyer de 125 ml, coloque 1/2 cucharadita de harina, 1/2 cucharadita de azúcar y 1 cucharadita de levadura.
- 2) En el primer matraz, agregue agua fría del grifo a la marca de 100 ml (la temperatura del agua debe ser de 60 grados Fahrenheit, 15 grados Celsius).
- 3) En el segundo matraz, agregue agua tibia a la marca de 100 ml (la temperatura del agua debe ser de 100 grados Fahrenheit, 38 grados Celsius).
- 4) En el tercer matraz, agregue agua hirviendo a la marca de 100 ml (212 grados Fahrenheit, 100 grados Celsius). Agita los frascos.
- 5) Coloque un globo sobre cada matraz. Tres colores diferentes ayudan a la identificación.

Parte II: Observaciones

1. ¿Qué observas en los primeros 5 minutos?

2. ¿Qué observas en 20 minutos?

3. ¿Qué observas en 60 minutos?

4. ¿Qué está explotando los globos?

5. ¿Qué matraz tenía la mejor temperatura? ¿Por qué?

6. ¿Qué crees que pasaría si se agregara el doble de azúcar? ¿Qué tal la mitad?

7. Levadura añadida a la masa de pan. ¿Por qué sube el pan?

8. ¿La temperatura afectará la rapidez con que se elevará el pan?

9. ¿Puedes ver evidencia de burbujas de dióxido de carbono en el pan?

10. Si agrega más levadura al pan, ¿se levantará más rápido?