

## Is Yeast Alive? --- Test for Metabolism

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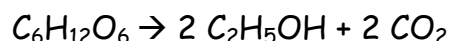


Humans use yeast every day. What is yeast, and what are some common uses of yeast? You can buy yeast to make bread in the grocery store. This yeast consists of little brown grains. Do you think that these little brown grains of yeast are alive? Why or why not?

To find out whether yeast is alive, we first need to think about what makes something alive. What are some characteristics of living organisms? To begin to answer the question, "Is yeast alive?" you will test whether the grains of yeast have two characteristics of living things -- the ability to grow and the ability to use energy (referred to as metabolism).

### Scientific Experiment to Test for Metabolism

We will carry out an indirect test for metabolism. In other words, we will be indirectly testing whether yeast can use energy, which is one of the characteristics of living organisms. When yeast, humans, and other living organisms use energy, they break down high-energy molecules like sugar to get the energy they need and give off a gas called carbon dioxide as a by-product of this reaction. We will test whether yeast can metabolize sugar and produce a gas which we will presume is carbon dioxide. Specifically, we will test whether yeast produces a gas when it has sugar available as a food vs. when no sugar is available.



### Prelab Questions:

1. Does yeast use energy and produce a gas when sugar is available?
2. Do you expect yeast to produce a gas when sugar is available?
3. Do you expect yeast to produce a gas when no sugar or other food is available?
4. Explain the reasons for your predictions.

## Procedure to Test Your Predictions

1. Set up four small test tubes and 1 large test tube in a test tube rack.
2. Label each small tube with a number, 1-4. Test tubes 1 and 2 will both have yeast, sugar, and water. Test tubes 3 and 4 will both have only yeast and water, with no sugar. Tube #5 will be used to mix yeast and water to evenly distribute into the small tubes.
3. Fill large test tube 4/5 full with warm tap water. Add \_\_\_\_\_ of dry yeast a little bit at a time, mixing the yeast in thoroughly before adding more. Mix by putting your hand or thumb over the top of the test tube and shaking. Add yeast slowly or it will clump.
4. Pour the yeast solution so that there is an equal amount in each of the four test tubes.
5. Add 2.5 grams of sugar to test tube 1 and 2.5 grams to test tube 2. These tubes will be your experimental group. Do not add sugar to tubes 3 and 4.
6. Add warm tap water to each test tube, filling each test tube 4/5 of the way to the top.
7. Cover the opening of each test tube with a balloon to catch any gas that is formed. Using the balloon to seal the end of the test tube, hold a finger over the end of each test tube, and shake it vigorously to thoroughly mix the contents.
8. Observe the test tubes and record your observations carefully in the data table. Then, every 5 minutes for 25 minutes, observe what occurs in the test tubes and any changes in the balloons which cover each test tube, and record your observations.

Hint:

If the yeast grains are capable of metabolism, it will take some time to produce enough carbon dioxide to see the change in the balloons.

	0 minutes	5 minutes	10 minutes	15 minutes	20 minutes	25 minutes
Test tube 1						
Test tube 2						
Test tube 3						
Test tube 4						

### Postlab

Write a result paragraph, conclusion paragraph, & application sentence on NB paper. Make 3 distinct sections. (Use SM Notes)

Bonus-take this a step further (10 points)

At home repeat lab using clear plastic bottles. Instead of using just sugar, try different forms of sugar, sugar substitutes, and/or different fruits. Label bottles clearly and take pictures. You can measure with a string and convert.