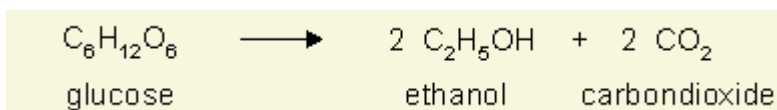


Cellular Respiration – Fermentation in Yeast

Introduction:

Cellular Respiration is the process by which cells obtain energy through the breakdown sugars in the presence of oxygen to produce ATP. Because this reaction uses oxygen, it is called **aerobic**. Reactions such as **fermentation**, which also break down sugars to release energy, do not require oxygen and are called **anaerobic**. Both processes require sugar to produce cellular energy. Yeasts are unicellular microorganisms of the fungi kingdom. They are facultative anaerobe, which means that they can respire or ferment depending upon environmental conditions. Here is the chemical reaction of fermentation, which produces ethanol and carbon dioxide as metabolic waste products.



Objective: In this lab, students will use the respiration powers of yeast to blow balloons. This activity will reinforce the basic principles of respiration as a fundamental metabolic process for living organisms using yeast as a model. It will also explore how humans use this biological knowledge in everyday life.

Materials:

- 2 balloons
- narrow funnel
- 20mL active dry yeast
- 15 mL sugar
- measuring cups
- water
- string
- ruler

Safety:

- Remind students there is NO eating or drinking in the lab.
- Students must not attempt to inflate the balloons with their mouths, especially after it is filled with the reacting agents.

Procedure:

1. Place the bottom of a funnel into the opening of the first balloon. You may need to stretch the opening of the balloon a little bit so that it fits.
2. Measure out 10 mL of yeast and carefully pour the yeast into the balloon through the funnel.
3. Measure out 5 mL of sugar and carefully pour the sugar into the balloon through the funnel.
4. Repeat steps #2 and 3 using 10mL of yeast and 10 mL of sugar.
5. Then fill the measuring cup with 30 mL of water from the cup provided and carefully pour the water into the balloon.
6. Remove the funnel from the opening of the balloon. Tie a knot in the balloon to keep the water-and-yeast mixture inside. Measure the circumference of your balloon from the knot around the top of the balloon and back to the knot using the string.
7. In the table below, record your observations.
8. After a certain amount of time, measure the circumference again and record the data.
9. Once finished with the lab, clean up lab station by gently placing the balloons in the designated bag and wiping up any spills with a paper towel.

Name: _____ Date: _____ Period: _____

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Pre-Lab Questions

Because cellular respiration **requires oxygen**, it is called an _____ reaction.

Because fermentation does not **require oxygen**, it is called an _____ reaction.

1. What sort of organisms carry out alcoholic fermentation?

2. The equation for alcoholic fermentation is in the introduction. Write out the equation.

Balloon Color	What was added to the balloon		Prediction of what will happen	
#1 _____				
#2 _____				
Balloon Color	Initial: Observations and circumference measurements (in cm)	Final: Observations and circumference measurements (in cm)	Explanation for any differences between balloons	Did Fermentation Occur?
#1 _____				
#2 _____				

Post-Lab Questions:

Discussion:

1. What are the reactants in the observed reaction?
2. What are the products?
3. How do you know that fermentation was occurring? What step from cell respiration is the only one occurring in fermentation? How many ATP can be made in fermentation compared to cell respiration?
4. What are the purposes of each of the following in the reaction: sugar, water and yeast?
5. Why is cell respiration important for living organisms? What is the equation for cell respiration?
6. How do people use the respiration powers of yeast? Or more specifically, what things can you make with yeast?