



Anaerobic Respiration Lab

ANYWHERE LABS

STEM LEARNING FOR GRADES 6-12

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Yeast is a **eukaryotic**, single celled organism that is classified as a fungus. Yeast is commonly found on plant leaves, flowers, and on the surface of the skin on some warm-blooded animals. One species of yeast, *Saccharomyces cerevisiae* (*S. cerevisiae*), is believed to have been originally isolated from the skin of grapes. This yeast species is commonly used to make beer and wine due to its ability to ferment.

Fermentation is a process that converts sugar into carbon dioxide and alcohol. This process happens in the absence of oxygen, making it an anaerobic process. The benefit of this process is that it allows the yeast to survive in environments when it doesn't always have access to oxygen. The detriment of this process is that high concentrations of alcohol can kill the yeast. The evolutionary advantage of fermentation is that it bides the yeast time to hopefully enter an oxygen rich environment.

When yeast is put into a sugar/water solution, carbon dioxide gas will be created, forming a foam on top of the liquid. In this experiment, you will use this foam to determine the effect of sugar concentration on the rate of anaerobic respiration.

Based on the information provided above, see if you can write the chemical equation for this anaerobic reaction.

_____ + _____ → _____ + _____

MATERIALS

From the Anaerobic Respiration Lab bag	From the Box	From Home
<ul style="list-style-type: none"> Yeast Sugar Balloons 	<ul style="list-style-type: none"> 4 large tubes (50mL) 	<ul style="list-style-type: none"> Cup of warm water

LABORATORY PROTOCOL

- Gather all supplies listed on the “Anaerobic Respiration Lab” bag. Fill the provided cup with **warm** tap water.
 - The water should not be boiling but should feel warm to the touch.
- Label four large tubes (50mL): 0, ¼, ½, and 1.
- Add 30mL of warm water to the 4 large tubes (50mL).
- Add sugar to the tubes in the amounts listed below and shake to mix.

Tube 1	Tube 2	Tube 3	Tube 4
No sugar	¼ tbsp	½ tbsp	1 tbsp

- Add ¼ tbsp of yeast to all four tubes and shake to mix.
- Remove the cap and place a balloon over the top of each tube. *It might be helpful to have another person hold the tube in place while adding the balloon.*
- Set a timer and leave the tubes undisturbed for 15 minutes for the reaction to occur.
- Look at the foam bubbles forming. Measure the amount of foam in each using the graduations on the tube and record your results below.
 - To calculate the amount of foam, use the graduated lines on the tube to take the measurement at the top of the foam and then subtract the measurement where the water begins.

	Tube 1	Tube 2	Tube 3	Tube 4
Volume of foam (mL)				

EXTENSION ACTIVITY

Design an experiment to determine the effect of simple carbohydrates (sugar) versus complex carbohydrates (flour) on the rate of anaerobic respiration.