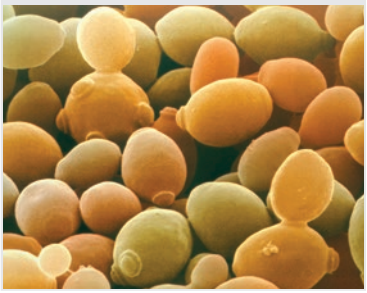
Hands-On Lab

Aerobic and Anaerobic Processes in Yeast

The species used in this investigation, *Saccharomyces cerevisiae,* like other species of yeast, is a facultative anaerobe. It can break down sugars using either aerobic or anaerobic processes, depending on the presence of oxygen. When oxygen is not present, yeast carry out ethanol fermentation. This process produces carbon dioxide and ethanol, a type of alcohol.

Predict How will you know whether aerobic or anaerobic processes are occurring in the bottle?

FIGURE 14: Yeast are single-celled organisms that belong to the group of organisms called fungi.



SAFETY

Obtain and wear goggles for this lab. Do not eat any materials used in this lab.

MATERIALS

- active dry yeast (1 package)
- balance (optional)
- balloon, round
- funnel
- graduated cylinder
- marker
- ruler, metric
- string, 30 cm
- sugar, granulated
- tablespoon (optional)
- timer
- water, very warm (40°C)
- water bottle, plastic, 500 mL
- weighing boat (optional)

PROCEDURE

1. Blow up the balloon a few times to stretch it.
2. Using the funnel, pour 150 mL of warm water into the bottle. Dry the funnel.
3. Using the dry funnel, add 1 packet of yeast to the water. Swirl the mixture gently.
4. Using the funnel, add 1 tablespoon (12 g) of sugar to the yeast solution, swirl, and quickly cover the bottle with the balloon. Allow the mixture to react for 5 minutes.
5. After 5 minutes have passed, use the string, marker, and ruler to measure the circumference of the balloon.
6. In a data table, record the circumference of the balloon, along with all of your observations of what is happening in the bottle. Continue making and recording observations every 5 minutes for the next 30 minutes.
7. Dispose of waste according to your teacher's instructions.

ANALYZE

1. Describe evidence, if any, that aerobic respiration took place in the bottle.
2. How does matter cycle during aerobic respiration? Explain how the reactants are rearranged to form the products. What is the source of energy, how is the energy transferred, and how is it used in the cell?
3. Describe evidence, if any, that fermentation took place in the bottle.
4. How does matter cycle during fermentation? Explain how the reactants are rearranged to form the products. What is the source of energy, how is the energy transferred, and how is it used in the cell?

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