

**Student Name:** \_\_\_\_\_ **Class:** \_\_\_\_\_



## **Yeast Populations Dynamics**

### **Laboratory Investigation Student Materials**

# Yeast Populations

## Student Materials

Yeast is a single-cell fungus that produces carbon dioxide as a byproduct of cellular respiration. The release of carbon dioxide causes bread dough to rise. Because the yeasts are small and reproduce rapidly, yeast organisms are useful for studying various factors such as food availability, temperature change and a shift in pH that may influence the rate at which a population grows. These cells produce carbon dioxide gas as a waste product and the amount of carbon dioxide produced directly relates to the number of living yeast organisms.

### Your Task

You and your lab partner will grow yeast in a molasses solution (food for the yeast) and investigate how one factor influences the change in yeast population growth as measured by the amount of carbon dioxide produced.

#### Suggested materials:

teacher prepared yeast suspension	test tube rack
teacher prepared 25% molasses solution	pH paper
several 1 ml graduated dropping pipettes	clean test tubes (18 mm x 150 mm)
100 ml graduated cylinder	clean test tubes (25 mm x 150 mm)
metric ruler	safety goggles
weak acid/base (provided at teacher's discretion)	lab aprons
refrigerator/microwave	electronic balance (optional)

## Designing and Conducting Your Experiment

**1. In your words, state the problem you are going to investigate. Write a hypothesis using an “If ... then ... because ...” statement that describes what you expect to find and why. Include a clear identification of the independent and dependent variables that will be studied.**

**2. Design an experiment to solve the problem.** Your experimental design should match the statement of the problem and should be clearly described so that someone else could easily replicate your experiment. Include a control if appropriate and state which variables need to be held constant.

### **General Procedure for growing yeast populations:**

1. Place 35 ml of 25% molasses solution into a small test tube.
2. Stir the yeast suspension and then place 1 ml of the yeast suspension into the same test tube.
3. Place the test tube in the rack.
4. Wash and rinse your hands. Place your palm over the end of the small test tube and invert it five times.
5. Carefully slide a larger tube down over the smaller tube. Quickly invert the tubes so the mouth of the large tube is up.
6. Using a metric ruler measure the height of the air bubble (mm or cm) in the smaller tube and record. Place in the test tube rack.
7. Incubate these samples for 24 hours at 30 degrees Celsius.
8. Measure the bubble and record the **change in the size due to carbon dioxide gas production** on your data table. (Subtract the initial gas bubble size from the total bubble size. Remember you will need this data to calculate the total **volume of carbon dioxide each day over five days.**)
9. Repeat steps 6-8 for five days.

**3. Review your design with your teacher before you begin your experiment.**

**4. Conduct your experiment.** While conducting your experiment, take notes and organize your data into tables.

**Safety note: Students must wear approved safety goggles and follow all safety instructions.**

**When you have finished, your teacher will give you instructions for cleanup procedures, including proper disposal of all materials.**

## Communicating Your Findings

Working on your own, summarize your investigation in a laboratory report that includes the following:

- **A statement of the problem you investigated. A hypothesis (“If ... then ... because ...” statement) that described what you expected to find and why.** Include a clear identification of the independent and dependent variables.
- **A description of the experiment you carried out.** Your description should be clear and complete enough so that someone could easily replicate your experiment.
- **Data from your experiment.** Your data should be organized into tables, charts and/or graphs as appropriate.
- **Your conclusions from the experiment.** Your conclusions should be fully supported by your data and address your hypothesis.
- **Discuss the reliability of your data and any factors that contribute to a lack of validity of your conclusions.** Also, include ways that your experiment could be improved if you were to do it again.