

EDCI 5724

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Yeast Beasts in Action! (5-E Model)

Purpose/rationale:

The purpose of this activity is for students to investigate yeasts in action as they break down hydrogen peroxide into water and oxygen gas, following the 5-E Learning Model. By participating in this activity, students will be able to measure the gas pressure caused by the oxygen gas that yeasts produce. Students will explore the relationship among yeast activity and different pH levels.

SOLs:

LS 1. The student will plan and conduct investigations that include the following:

- organizing data
- using metric units
- constructing and interpreting continuous line graphs, then used to make predictions
- evaluating and defending interpretations from a set of data
- understanding how the nature of science is developed and reinforced.

LS 4. Students will investigate factors that must be met in order to carry out life processes. Key concepts include factors that influence life processes.

Materials and Resources:

activity sheet	dropper
computer	3% hydrogen peroxide
1-hole stopper	yeast suspension
10mL graduated cylinder	1 test tube
Vernier Gas Pressure Sensor	large beaker
probeware software	acidic (diet soda) <i>or</i> basic (antacid) <i>or</i> neutral (milk) mixture

Safety:

Safety goggles must be worn.

Procedures:

Engage:

1. The teacher will engage the students in learning about yeast activity by demonstrating “yeast bubbling.” The teacher will probe students’ prior knowledge of yeasts by asking open-ended questions (see activity sheet).

Explore:

2. Students will explore yeast activity in one of three pH conditions by completing the probeware lab “Yeasts Beasts in Action!” (see activity sheet).

Explain:

3. Students will save and print their probeware computer results/graph and then compare results with the other two student groups. Data for the highest pressure of each run can be combined and graphed for a visual comparison. Students will then explain how pH levels affected yeast activity (comparison of highest pressure for each of the pH levels) and discuss why this may have occurred. Students may consult their textbook and/or the teacher for further explanation.

Elaborate:

4. Students will extend their understanding of yeast activity by designing and performing an experiment which finds the most suitable pH for yeast.

Evaluate (assessment):

5. Students will provide the following evidence for understanding yeast activity:

Performance Criteria	Evidence	Points or Rating*
Students should suggest and support idea for what occurred during “yeast bubbling” demonstration.	Completion of questions on activity sheet.	
Students should explain the effects of pH on yeast activity, in addition to why we measured gas pressure.	Completion of “Yeasts Beasts in Action!” activity and questions on activity sheet.	
Students should discuss how organisms are affected by pH. This includes noting that organisms are often best adapted to particular pH levels.	Development and performance of experiment which finds most suitable pH for yeast. Completion of questions on activity sheet.	

*2 = completes activity and explanation without mistakes

1 = completes activity but offers incomplete explanation

0 = does not complete activity or explanation

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Yeast Beasts in Action! “Activity Sheet”

Purpose: In this activity, you will investigate yeast activity at different pH levels.

Engage: “Yeast Bubbling” demonstration

1. What is yeast?
2. What do you know about yeast?
3. What did you observe during this demonstration and why?

Explore: “Yeasts Beasts in Action!” activity

1. What gas are you measuring with the gas pressure probe? What is this an indication of?
2. How do you think each pH level will affect yeast activity?
3. Why (how) do you think pH levels affect yeast activity?

Procedure:

1. **PUT ON YOUR SAFETY GOGGLES!!!!**
2. Place your test tube in a large beaker. Label it either A, B and N depending upon which liquid your group receives. This will stand for Acid, Base, or Neutral.
3. Add 3mL of Hydrogen Peroxide to 3mL of your acid/base/neutral liquid into the particular test tube. (Test tube A = 3ml Hydrogen Peroxide + 3mL Acid)
4. Using a clean dropper, add 2 drops of yeast suspension to your test tube. Make sure that the yeast does not touch the sides of the test tube.
5. Put stopper (connected to gas pressure probe) onto test tube, making sure that it is air tight.
6. Swirl the tube to mix the contents.
7. Connect test tube and gas pressure probe to probeware equipment/software.

8. Click Connect to begin data collection.
9. Data will be collected for 2 min. DO NOT SHAKE THE TUBE DURING DATA COLLECTION
10. When data collection ends record the highest pressure for the run.
11. Choose store Latest Run from the experiment menu to store your data.
12. Disassemble stopper, test tube, gas pressure probe, and probeware equipment/software.
13. Save and print results/graph. Compare results to other student groups.

Mixture	Highest Pressure (kPa)
Acidic test tube	
Neutral test tube	
Basic test tube	

Explain:

What did you observe during this experiment?

How did your observations compare with the rest of the class?

How do you explain your overall observations (using class data)?

What you think yeast is used for in bread?

Elaborate:

How would you determine the most suitable pH for yeast?

What materials would you need?

What safety procedures would you implement?

Do you think other organisms have “most suitable” pH levels?