

WHAT IS THE EFFECT OF BIODEGRADABLE WASTE ON THE AMOUNT OF DISSOLVED OXYGEN?

PURPOSE:

Biodegradable means that a substance can be broken down by living organisms (decomposers). Since decomposition is a form of respiration, oxygen is consumed. In this lab you will learn that a great deal of biodegradable waste in water consumes much dissolved oxygen leaving little for plant and animal life.

In this lab the yeast will represent the decomposers. The milk is the biodegradable material and the methylene blue is an indicator. It will change from "blue" to "white" when there is no more oxygen present in your mixture. (Actually, the color change is from blue to colorless, but because the milk is white this causes the color change to be to white).

MATERIALS:

3 test tubes of equal size	yeast mixture, 2 mL dry yeast and 20 mL water
test tube rack	milk
pipette	Methylene blue, dropper bottle

PROCEDURE:

1. Label the three test tubes #1, #2, and #3. Place them in the test tube rack.
2. Using your pipette, add the amount of materials to each test tube as shown in the chart below:

Test Tube #	# Drops Milk	# Drops H ₂ O
1	37	0
2	15	22
3	3	34

Be sure that the height of the liquid in each of the three test tubes is exactly the same.

3. Add three drops of methylene blue to each test tube.
4. Mix the methylene blue with the milk/water mixture by placing your thumb over the test tube and inverting each test tube four times.
5. For the next part of the lab one of you will need to carefully time the experiment. As you mix each test tube with the yeast you will need to begin timing at once.
6. Add 20 drops of the yeast mixture to test tube #1. Mix thoroughly by inverting four times and record the exact time that you add the yeast to the tube.
7. Now do the same for test tubes #2 and #3. Timing is critical. Begin timing each test tube as soon as you add the yeast. Record your time information on the data table below.

8. When the color has changed from blue to white in each test tube, record the exact time at which the change was complete. The surface of each test tube will remain blue. Why?

Test tube #	Mixing time (A)	Time of color change (B)	Total time for color change (B - A)
1			
2			
3			

Note: It can take as long as 15 minutes for the color change; but the average time is four to five minutes.

QUESTIONS:

1. What is the gas taken in by the microorganisms?
2. What is the gas given off by the microorganisms?
3. Where do microorganisms living in water get the oxygen that they use in decomposition?
4. Where do the green plants living in water get the carbon dioxide that they need?
5. BEFORE YOU CLEAN UP, SHAKE ONE OF THE TEST TUBES WHICH HAS TURNED WHITE. What happens? Why?
6. Why is the oxygen in this experiment used up?
7. Which part of your experiment represents the decomposers?
8. Which part of your experiment represents the sewage dumped into the water?
9. In which test tube did you have the most sewage?

In which test tube did you have the least sewage?
10. Using a piece of graph paper, graph your results. Construct a line graph.
11. What does this graph tell you about the relationship between the amount of biodegradable waste in water and the amount of dissolved oxygen in the water?
12. What would be the effects of dumping a great deal of raw sewage into a river as regard to the dissolved oxygen in the same river?
13. Write a good conclusion as to what you learned by performing this lab.