

NAME _____ DATE _____ CLASS _____

LAB 20

Plant Respiration

Chapter 10

Plants use energy to stay alive. Green plants use energy from the sun to make sugar from carbon dioxide and water, a process called photosynthesis. This releases oxygen.

During respiration, a process that breaks down the sugar to make its energy readily available, this oxygen is used. Energy, carbon dioxide, and water are released. Respiration continues throughout the life of a plant, day and night. Seeds that have not yet sprouted contain no chlorophyll. Chlorophyll is not manufactured until the embryo emerges and turns green. Until that time, seeds obtain all their energy through respiration.

The carbon dioxide plants give off during respiration is colorless and odorless. It can be detected by using a liquid called bromothymol blue.

OBJECTIVES

In this experiment, you will

- produce carbon dioxide in a test tube,
- detect the presence of carbon dioxide with bromothymol blue, and
- use the color change to test for carbon dioxide from plants.

EQUIPMENT

- 2 beakers (25 mL each)
- bromothymol blue
- effervescent tablet (Alka Seltzer)
- flask (100 mL)
- 2 jars (large, with lids)
- 24 seeds (soaked overnight, lima bean)
- straw
- 2 test tubes
- towels (moist, paper)
- tube (5 cm long, 5 mm inside diameter, glass, inserted in rubber stopper [1-hole] by your teacher)
- tubing (rubber)

PROCEDURE

Part A—Testing an Effervescent Tablet

1. From your teacher, get a rubber stopper which has inserted in it a glass tube.
2. Half fill a test tube with bromothymol blue. Record the color of bromothymol blue in the Data and Observations section. Half fill a second test tube with water.
3. Place the rubber stopper into the tube containing water. Place one end of a piece of rubber tubing over the glass tube and the other end into the tube of bromothymol blue. See Figure 20-1.
4. Remove the stopper from the test tube with water in it. Drop 1/4 of an effervescent tablet into the water and quickly replace the stopper.
5. Wait 3 minutes. Record the color of the bromothymol blue in the data table.

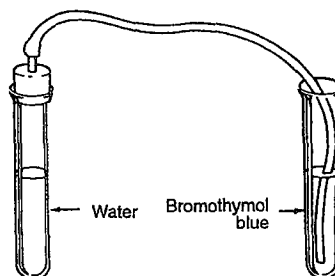


FIGURE 20-1

Part B—Testing Lima Beans

1. Place a 25-mL beaker with 15 mL of bromothymol blue into a large glass jar. Also place in the jar a moistened paper towel and put the lima bean seeds on top of the towel. See Figure 20-2.
2. Assemble an identical jar with no bean seeds.
3. Cover the jars. After 24 hours, observe the color of the bromothymol blue in the beakers and record in the data table.



FIGURE 20-2

DATA AND OBSERVATIONS

TABLE 20-1

Source of carbon dioxide	Color of bromothymol blue	
	Before	After
Effervescent tablet		
Lima bean seeds		
Jar without bean seeds		

CONCLUSIONS

1. What color change occurs in bromothymol blue when carbon dioxide gas is added to it?

2. What gas is given off by living seeds? _____ What proof do you have?

3. What was the purpose of the jar with no bean seeds? _____

GOING FURTHER

Are plants the only living things that give off carbon dioxide? To find out, try the following: fill a flask one-fourth full with bromothymol blue. Place a straw in the flask and blow through the straw twenty times. Make sure your breath is bubbling through the liquid. **CAUTION:** Do not suck any of the liquid into your mouth.

DISCOVER

Some people believe it is harmful, especially for a sick person, to sleep at night in a room that has a plant in it. Why do you think the people feel this way? Write your answer to this question. Then, choose one of these plants to research: the potato, daffodil, foxglove, or rhubarb. Find out if it is harmful to people, and write about your findings.