

Activity

Plants With Seeds

The Ins and Outs of Photosynthesis**Introduction**

Blue-green bacteria, plantlike protists, and green plants perform a special process known as photosynthesis (foh-toh-SIHN-thuh-sihs). In photosynthesis, light energy is used to combine carbon dioxide and water to form food and oxygen. As you read in the textbook, oxygen is very important to humans and many other living things. Oxygen, which we humans take in when we breathe in, is used to break down food to release energy—energy that powers all life processes. The breakdown of food also produces carbon dioxide, which is removed from the body when we breathe out. What do organisms that can perform photosynthesis do with carbon dioxide?

In this activity you will observe the “ins and outs” of photosynthesis and the complementary process of food breakdown, or respiration.

Materials

3 125-mL flasks

bromthymol blue solution

light source

3 #5 rubber stoppers

2 sprigs of *Elodea*, about the same size

drinking straw

100 mL graduated cylinder

Procedure  

1. Using the graduated cylinder, measure out 100 mL of bromthymol blue solution for each of the three flasks. **CAUTION:** *Bromthymol blue is a dye and can stain your hands and clothing.* What color is the bromthymol blue solution? _____
2. Put the straw into one of the flasks. Gently blow bubbles into the solution until there is a change in its appearance. How does the solution change? _____

Repeat this procedure with the other two flasks.



3. Place one sprig of *Elodea* in each of two of the flasks. Stopper all three flasks.
4. Put one flask containing *Elodea* in the dark for 24 hours. Put the other two flasks on a sunny windowsill for the same amount of time.
5. After 24 hours, examine each flask. What do you observe? _____

Analysis and Conclusions

1. What substance did you add to the bromthymol blue solution when you blew bubbles into it? _____
Where did this substance come from? _____
What effect did this substance have on the solution? _____

2. What happened in the flask that was kept in the dark? Explain why this occurred.

3. What happened in the flask containing *Elodea* that was kept in a sunny spot? Why?

4. What was the purpose of the flask that did not contain *Elodea*? _____

5. How are the "ins," or raw materials, for photosynthesis related to the "outs," or products, of respiration? _____

6. How are the "outs" of photosynthesis related to the "ins" of respiration? _____

7. How is photosynthesis related to respiration? _____

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In this activity you will observe the “ins and outs” of photosynthesis and the complementary process of food breakdown, or respiration.

Materials

3 125-mL flasks	bromthymol blue solution	light source
3 #5 rubber stoppers	2 sprigs of <i>Elodea</i> , about the same size	drinking straw
100 mL graduated cylinder		

Procedure  

1. Using the graduated cylinder, measure out 100 mL of bromthymol blue solution for each of the three flasks. **CAUTION:** *Bromthymol blue is a dye and can stain your hands and clothing.* What color is the bromthymol blue solution? blue
2. Put the straw into one of the flasks. Gently blow bubbles into the solution until there is a change in its appearance. How does the solution change? yellow

Repeat this procedure with the other two flasks.



3. Place one sprig of *Elodea* in each of two of the flasks. Stopper all three flasks.
4. Put one flask containing *Elodea* in the dark for 24 hours. Put the other two flasks on a sunny windowsill for the same amount of time.
5. After 24 hours, examine each flask. What do you observe? _____

Control - blue

elodea in dark - greenish blue

elodea in sun - dark blue

Analysis and Conclusions

1. What substance did you add to the bromthymol blue solution when you blew bubbles into it? carbon dioxide

Where did this substance come from? our respiration/exhaling

What effect did this substance have on the solution? it turned the substance yellow

2. What happened in the flask that was kept in the dark? Explain why this occurred.

without sunlight the rate of photosynthesis decreased therefore producing less oxygen and removing less carbon dioxide

3. What happened in the flask containing *Elodea* that was kept in a sunny spot? Why?

provided with enough light, photosynthesis took place and oxygen was emitted as carbon dioxide was absorbed by the *elodea*

4. What was the purpose of the flask that did not contain *Elodea*? it was used as a control in the experiment

5. How are the "ins," or raw materials, for photosynthesis related to the "outs," or products, of respiration? they are the same -

the "ins" of photosynthesis are the "outs" of respiration

6. How are the "outs" of photosynthesis related to the "ins" of respiration? they

are the same - the "outs" of photosynthesis are the "ins" of respiration

7. How is photosynthesis related to respiration? each process is

part of a cycle which sustains our environment by exchanging nutrients

between living organisms and non-living factors