

Sec.: _____ Name: _____

Experiment: Effect of Light Wavelengths on
Photosynthesis
(B. Science 10-8-3c)

Purpose: To examine the effect of the different wavelengths of light on photosynthesis.

Materials: 200 ml beaker lamp
bromthymol blue straw Elodea
6 test tubes test tube rack stoppers
growth chamber (red, yellow, green, blue, clear)
0.1% HCl

Methods:

1. Fill a beaker with 100 ml of water. Add bromthymol blue to color the water a pale blue. Using a soda straw, blow into the solution to add CO₂. This will cause a change in color. What color does the solution become?
2. What caused this color change?

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3. Place 5 test tubes in a test tube holder and insert a sprig of Elodea in each. Add the solution from the beaker to cover the sprigs of Elodea in the test tubes. Place a stopper in each test tube.
4. Fill a sixth test tube with the same solution, but do not place an Elodea sprig in it. Stopper this tube. What function does this tube perform?
5. Place one test tube in red, another in blue, another in yellow, another in green, and other in white light. Expose the test tubes in the rack to the light for about 20 minutes. Examine each test tube and record the color of each tube.
6. How do you account for the changes in the test tubes?
7. What substance were the Elodea sprigs absorbing?
8. Remove the Elodea from the 5 test tubes. Add 0.1% HCl drop by drop to each test tube until the original color returns. Count the number of drops necessary for each to change color. Record your findings in the second column of the table.
9. Why does the hydrochloric acid (HCl) return the color to the original?
10. What was the color of the liquid in the tube without the Elodea?

Results:

1. Color: _____ 2. Causes: _____

4. Function: _____

<u>test tube</u>	<u>indicator color after 20 min.</u>	<u>number of drops of HCl</u>
red		
yellow		
green		
blue		
clear (plant)		
clear (none)		

6. changes: _____

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7. substance: _____

9. why: _____

10. color: _____

Conclusions:

1. Which wavelength (color) was most effective in increasing the rate of photosynthesis?

2. Which color was least effective in increasing the rate of photosynthesis?

3. What was the purpose of the sixth test tube containing no Elodea?

4. What substance was absorbed by the Elodea sprigs?

5. What substance was produced by the Elodea sprigs?

Discussion:

1. Which wavelength was most effective in speeding up the rate of photosynthesis? Explain how you know.

2a. Read Psalm 147: 8, 9. What does God cover the sky with?

2b. What does he supply the earth?

2c. What does he provide for the cattle and young ravens when they call?

2d. After reading this text discuss God's role in maintaining proper amounts of photosynthesis in our world.

3. If you wanted to get most oxygen out of your plant what wavelength (color) of light would you shine on the plant?

4. Fill in the Blanks:

a. The _____ reaction takes place within the saclike _____ that are located inside an organelle known as the _____.

b. Sunlight is captured by clusters of pigment molecules called _____ that contain several hundred _____ molecules as well as a number of accessory pigments.

c. Electrons are passed from one _____ to the next during the process of _____.

d. _____ is "split" to produce hydrogen ions, _____ gas, and _____ that replace those lost by chlorophyll.

e. An enzyme uses the energy created by a difference in charges across a membrane to add a (an) _____ group to ADP to form _____.

f. The light reaction uses _____, ADP and _____ to produce oxygen, _____, and _____.