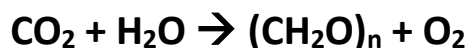


Photosynthesis: Demonstrating Oxygen Production

Photosynthesis is the process where producers, primarily plants and algae use carbon dioxide and water to produce oxygen and a carbohydrate. The general equation is usually written something like this:



Oxygen is a measurable product of photosynthesis. It is produced within the chloroplast, in a reaction called photolysis. An enzyme associated with a photosystem splits a molecule of water to release hydrogen ions, electrons and oxygen.

In this activity you will observe oxygen production by water plants under different light conditions.

Materials

Distilled water	Pipette – 1 mL
Test tubes – 5 (18 mm x 150 mm)	Rubber stopper with hole
Test tube racks	Straw
Colored lights (green, red, blue, white) or 'cool lights' with filters	Erlenmeyer flask - 250 mL
Marker	Elodea, water/aquarium plant
	Phenol red (optional)

Procedure

1. Acquire the needed supplies from the common supply area. If needed, assemble the volumeter (rubber stopper and pipette). Insert the pipette into the stopper by carefully twisting the stopper around the pipette. The pipette will need to extend at least one third of the way into the test tube when the stopper is inserted.
2. Return to the supply table and pick up the Erlenmeyer flask. Fill the flask with approximately 150 mL of water. If you are using phenol red, add several drops and swirl the flask to disperse the pH indicator. Phenol red is yellow below pH 7, orangeish around pH 7 and red above pH 7. What color is your flask now? _____
3. Insert the straw and blow into the flask. Keep blowing until you see a change in the color of the phenol red. What happened to the color of the phenol red? Did the phenol red change colors? _____ What caused the color change? _____
4. Add a large pieces of a water plant to each test tube.
5. Pour the solution from the flask into each test tube. Fill each test tube about 4/5 full.
6. Firmly insert a volumeter into each test tube. Fluid should come up the pipette above the level of the stopper. Note the mL marking for each test tube when the stopper is inserted. This is your zero time value.
7. Place one test tube in a rack on the benchtop under ambient light. One should be placed in a test tube rack front of a green light. One should be placed in a test tube rack in front of a red light. The final test

tube should be placed in a test tube rack in front of a white light or grow light. If your lab is not equipped with special filters or plant lights you may need to place a water-filled barrier (beaker) between the light and your experimental test tubes. To keep your experimental test tubes cool. The lights can get very hot.

8. Allow the reaction to proceed for 1 hour. Mark the displacement of liquid on the pipettes at 1 hour. Note the color of phenol red. Record your results below.

9. After the second hour, measure the displacement of liquid on the pipettes. Note the color of phenol red. Record your results below.

	Displacement of Liquid (mLs)		Color of Phenol Red	
	1 Hour	2 Hour	1 Hour	2 Hour
Bench Top				
Red light				
Green light				
Blue light				
White light (grow light)				

1. What was the purpose of blowing into the water?
2. Why was phenol red used? What caused the color change?
3. From your results, which light condition resulted in the most photosynthesis?
4. What is the independent variable in this experiment?
5. What is the dependent variable?