Module 6: Photosynthesis Lab

# Overview

This focus of this lab will be on photosynthesis. Photosynthesis is the process by which plants and other autotrophs use the energy of sunlight to make energy rich carbohydrates from carbon dioxide and water. The general equation for photosynthesis is shown below:

**6CO2 + 6H2O sunlight----🡪C6H12O6 + 6O2**

To help you learn more about photosynthesis, you will watch a virtual experiment. You will measure the rate of photosynthesis in *Elodea* (an aquatic plant) as it is exposed to different intensities of light.

# Exercise 1: Measuring the Rate of Photosynthesis of *Elodea*

During photosynthesis, bubbles are given off by Elodea. By measuring the rate at which the bubbles are produced, it is possible to tell how fast the plant is photosynthesizing. You will watch the [BIOL 100: M6 Photosynthesis Lab Example](https://www.youtube.com/watch?v=3BzCJa7vP7U). During the experiment, the light source is moved two different distances from the plant to observe the effects on the rate of photosynthesis. You will record the results of the two simulations observed in the example in Table 1 and answer the questions below.

Note: The Photosynthesis Website mentioned in the video above is no longer available. You should use the information provided in the video above to complete the lab.

## Table 1: The Effects of Light Intensity on Rate of Photosynthesis in *Elodea.* (2 points)

|  |  |
| --- | --- |
| Distance of Light Source (mm) | Bubbles Per Minute (BPM) |
| 100 mm | 200 BPM |
| 180 mm | 52 BPM |

1. What product of photosynthesis is producing the bubbles? (1 point)

The bubbles are most likely to be oxygen, is a by-product of photosynthesis.

1. Based on the results of your experiments, describe the relationship between light intensity and the rate of photosynthesis. (3 points)

The rate of photosynthesis is directly proportional to light intensity, up to a certain point. Based on the results, the closer the light source (100mm), the higher the Bubbles Per Minute (BPM), indicating faster photosynthesis.

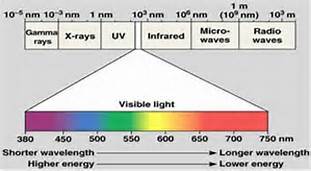
1. What would happen to the rate of photosynthesis if green light was used instead of white light? Explain your answer. (3 points)

Green light is less effective for photosynthesis because chlorophyll reflects green light rather than absorbing it. The rate of photosynthesis would likely decrease.

1. What would happen to the rate of photosynthesis if the plant was placed in the dark? Explain your answer. (3 points)

Photosynthesis would not be present in the absence of light. Light is one of the primary reactants.

# Review Questions



1. What do the different colors of visible light represent? What is the relationship between energy and wavelength of visible light? (3 points)  
     
   Different colors represent different wavelengths of light. The relationship between energy and wavelength is inverse; shorter wavelengths (like violet) have higher energy, and longer wavelengths (like read) have less energy.
2. Describe the function of Chlorophyll in photosynthesis. (3 points)  
     
   The function of Chlorophyll in photosynthesis is to absorb light and convert it into a form that can be used in the synthesis of glucose from carbon dioxide and water.
3. Fill-in the reactants (inputs) and products (outputs) of photosynthesis. (4 points)

Reactants Products

**\_**6 CO2**\_ + \_**6 H2O**\_+\_sunlight----🡪\_\_**C6H12O6**\_\_\_ + \_**6 02**\_\_\_**

1. In which organelle does photosynthesis occur? (1 point)  
     
   The organelle in which photosynthesis occurs would be the chloroplasts.
2. Differentiate between the light “photo” reactions and the carbon “synthesis” reactions in photosynthesis. (3 points)  
     
   The difference between the light “photo” reactions and the carbon “synthesis” reactions in photosynthesis is that light “photo” reactions capture light energy and convert it into chemical energy (ATP and NADPH). Carbon “synthesis” reactions use that chemical energy to convert carbon dioxide into glucose.
3. Describe the roles of the kinds of organisms within an ecosystem.
4. Autotrophs (2 points)  
   These organisms produce their own food via photosynthesis or other methods, serving as the base of the food chain
5. Heterotrophs (2 points)

Heterotrophs can’t produce their own food and rely on consuming other organisms for energy.