
**Directions:** Answer the following questions in complete sentences.

1. Plants use photosynthesis to make _______________ for the plant.
2. What do plants need in order to perform photosynthesis?
3. How is the plant able to obtain each “ingredient?”
4. Identify the plant cell organelle in which photosynthesis takes place.
5. Summarize the process of photosynthesis.

Water and carbon enter the chloroplast.....

6. What happens to the oxygen that is produced as a result of photosynthesis?
7. Why is photosynthesis also important for people and animals?

**Virtual Lab #1:** Measuring the Rate of Photosynthesis of Elodea from the University of Reading

Visit this link: [http://www.reading.ac.uk/virtualexperiments/ves/preloader-photosynthesis-full.html](http://www.reading.ac.uk/virtualexperiments/ves/preloader-photosynthesis-full.html)

*The Elodea plant through photosynthesis gives off bubbles. By measuring the rate at which the bubbles are produced it is possible to tell how fast the plant is photosynthesizing. The faster the bubbles are being produced, the faster the rate of photosynthesis. Read and follow the directions on how to use this lab simulator. Press start and record the bubbles per minute for each of the following light distances.*

<table>
<thead>
<tr>
<th>Light Distance (cm)</th>
<th>Bubbles per minute</th>
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<tbody>
<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td></td>
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<tr>
<td>150</td>
<td></td>
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<tr>
<td>180</td>
<td></td>
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<tr>
<td>200</td>
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</table>
Now graph your data. Label each axis & give the graph a title.

Calculate the rate of photosynthesis by drawing a line of best fit and calculating the slope of that line (rise/run).

Directions: Answer the questions in complete sentences based on the results of the simulation you just finished.

1. Based on your data, draw a conclusion regarding how light intensity affects the rate of photosynthesis.

2. How does this compare to what you already know about photosynthesis?

Virtual Lab #2 - Visit this link: http://www.kscience.co.uk/animations/photolab.htm

This simulation allows you to manipulate many variables. You already observed how light colors affect the growth of a plant in a previous lab. In the last simulation you also directly measured the rate of photosynthesis by counting the number of bubbles of oxygen that are released.

There are 3 other potential variables you could test with this simulation: amount of carbon dioxide, light intensity, and temperature. Keep the light settings at white light since you have already tested colored light in a previous experiment.

1. First, set the thermometer to 25°C (Room Temperature) and the light intensity to 20.
   a. What were the bubbles per minute at this setting? ______ bpm
   b. Now increase the CO2 available to the Elodea. What were your bubbles per minute? ______ bpm
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c. Based on your data, how does the amount of available CO2 affect the rate of photosynthesis?

2. Keep your settings from #1 (25°C, light intensity of 20, increased CO2).
   a. What were the bubbles per minute at this setting? _______ bpm

   b. Now increase the temperature to 40°C. What were your bubbles per minute? _______ bpm

   c. Based on your data, how does an increase in temperature affect the rate of photosynthesis?

3. Return to your settings from #1 man (25°C, light intensity of 20, increased CO2).
   a. What were the bubbles per minute at this setting? _______ bpm

   b. Now decrease the temperature to 10°C. What were your bubbles per minute? _______ bpm

   c. Based on your data, how does a decrease in temperature affect the rate of photosynthesis?

4. Alter the variables in order to determine which combination leads to the highest rate of photosynthesis. Which combination of settings produced the highest number of bubbles per minute?
   a. Temperature: _________
   b. Light: _________
   c. CO2: _________

Putting It All Together: Why Photosynthesis is Important to Humans

Consider the following questions:

- What is the importance of photosynthesis to living things other than plants?

- What would happen in a world without plants?

- Imagine the sun stopped producing light, but didn't consume the Earth. What would happen to life on Earth after 20 minutes? 20 hours? 20 days? 20 years?