

Name: _____ Date: _____

Student Exploration: Photosynthesis Lab

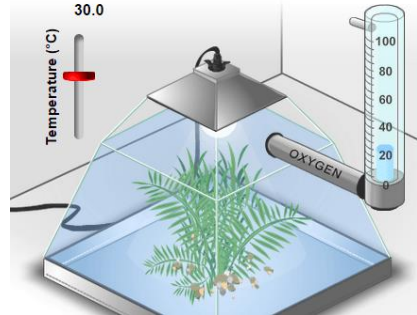
Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

What is the purpose of this activity? What are you supposed to be learning from it?

Gizmo Warm-up

During **photosynthesis**, plants use the energy of light to produce **glucose** (C₆H₁₂O₆) from **carbon dioxide** (CO₂), and water (H₂O). Glucose is a sugar that plants use for food and as a building block for cellulose and starch.

A waste product of photosynthesis is **oxygen**. Plants use some of the oxygen they produce, but most of it is released. In the *Photosynthesis Lab Gizmo™*, you can monitor the rate of photosynthesis by measuring oxygen production.

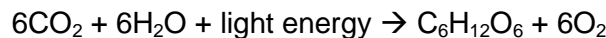


1. Observe the left pane closely. What do you think the bubbles are? _____
2. Change different factors such as light or CO₂ levels and observe what happens to the oxygen production. If oxygen production increases, what does this mean for the rate of photosynthesis?

<p>Activity A:</p> <p>Optimal conditions</p>	<p><u>Get the Gizmo ready:</u></p> <ul style="list-style-type: none"> • Be sure that the BAR CHART tab is selected. • Turn on Show numerical values. 	
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Question: In the Gizmo, what are the ideal conditions for photosynthesis?

1. Form hypothesis: During photosynthesis, light energy is used to synthesize carbon dioxide (CO₂) and water (H₂O) into glucose (C₆H₁₂O₆) and oxygen (O₂). The complex series of chemical reactions is summarized by the following formula:



In the Gizmo, what you are able to change the **temperature, light intensity, CO₂ level, and color of light**. Choose **one** factor you wish to study, and write a scientific question about the effect of this factor on the rate of photosynthesis.

Write a hypothesis on what level of that factor would be **optimal** for photosynthesis.

2. Plan: Design an experiment and use the Gizmo to test your hypothesis for the optimal conditions for photosynthesis.

A. Independent variable _____

B. Dependent variable _____

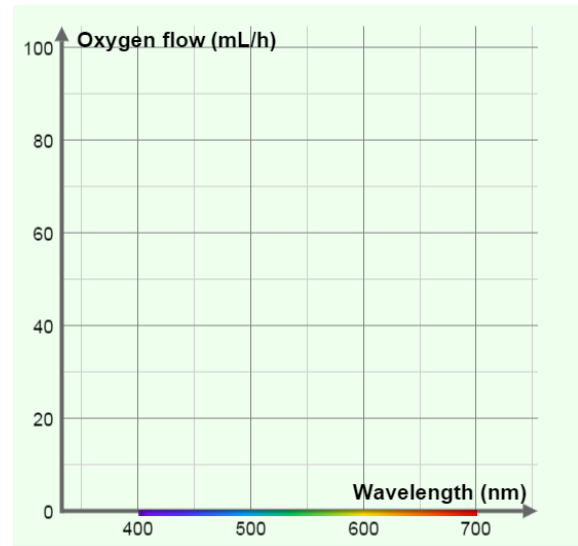
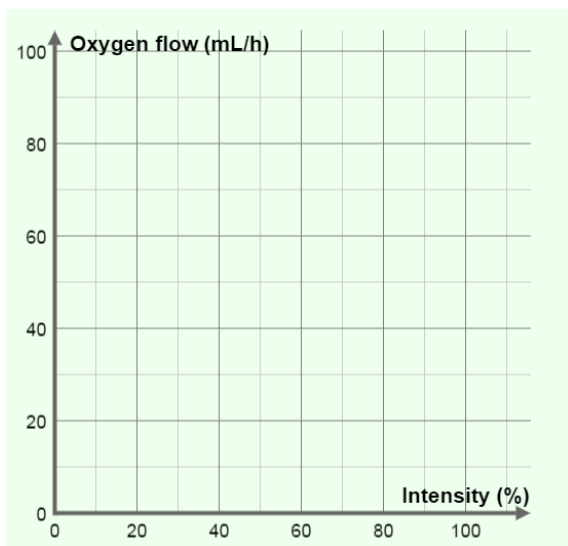
C. Constants (3) _____

D. Control group _____

3. Experiment: Run your experiment and complete the data table shown below:

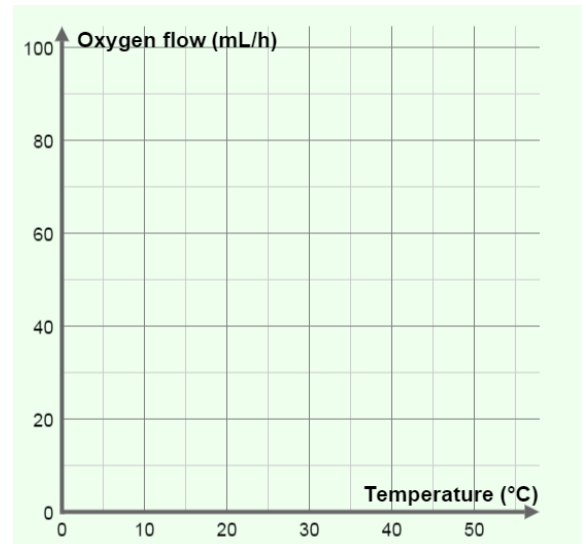
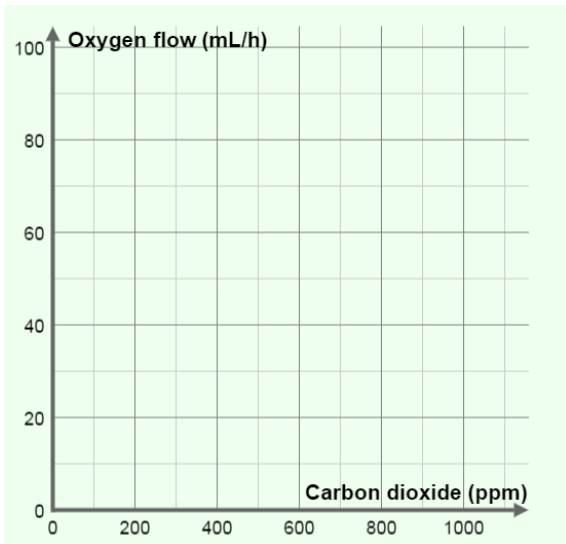
Temperature	Light intensity	CO ₂ level	Light wavelength ("W" if white)	Oxygen production

3. Analyze: Choose the appropriate graph below and plot your data. Leave the other graphs blank for now.



*For the CO₂ level from white light, draw a dotted horizontal line across the graph





4. **Share:** Find groups that performed experiments on the other three variables and plot their data on the other graphs above.
5. **Conclude:** Write a conclusion that describes the optimal conditions for photosynthesis for the variable you tested (not all variables).

<p>Claim (What is the answer to your original scientific question?) Photosynthesis works best at...</p>	
<p>Evidence (Describe what your data looks like.) Oxygen production was highest at...</p>	<p>Reasoning (Explain what your data means.) The evidence (data) supports my claim because...</p>

*If you wish, you may write your conclusion on the back of this sheet without the CER framework, but be sure to include all parts of the conclusion.

