

Photosynthesis · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; current subject brief acquired; full Biology guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Photosynthesis · 1.1

Reasoning

A brighter lamp does not always produce more oxygen from pondweed. Another factor may limit the process when light is already sufficient. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Photosynthesis · 2.1

Reasoning

Photosynthesis transfers energy from light into chemical stores. Carbon dioxide and water form carbohydrate, releasing oxygen. Chlorophyll absorbs light; light intensity, temperature and carbon dioxide supply can affect rate. limiting factor : A factor whose shortage restricts rate; photosynthesis: Light-driven formation of carbohydrate.

Photosynthesis · 3.1

Reasoning

Change only one factor when testing a limiting factor. At low light, extra light may increase rate. At a plateau, the changed factor is no longer the main limit in that range; the graph alone does not identify which other factor is limiting. Measure collected gas volume over a fixed time instead of assuming all bubbles have the same volume. Control temperature, plant size and carbon dioxide supply. Allow the plant to adjust before each reading and repeat.

Photosynthesis · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: 6.0 cubic centimetres of gas are collected in 3.0 minutes. Use $\text{rate} = \text{volume}/\text{time}$. $\text{Rate} = 6.0/3.0 = 2.0$ cubic centimetres per minute. Bubble counts can be a rough proxy, but bubbles of different size make comparisons less reliable.

Photosynthesis · 4.2

Reasoning

9.0 cubic centimetres of gas are collected in 3.0 minutes. Find the rate. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Photosynthesis · 5.1

Reasoning

Moving a lamp changes light and may also change temperature. A photosynthesis experiment needs control of heating, not just a ruler. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Photosynthesis · 5.2

Reasoning

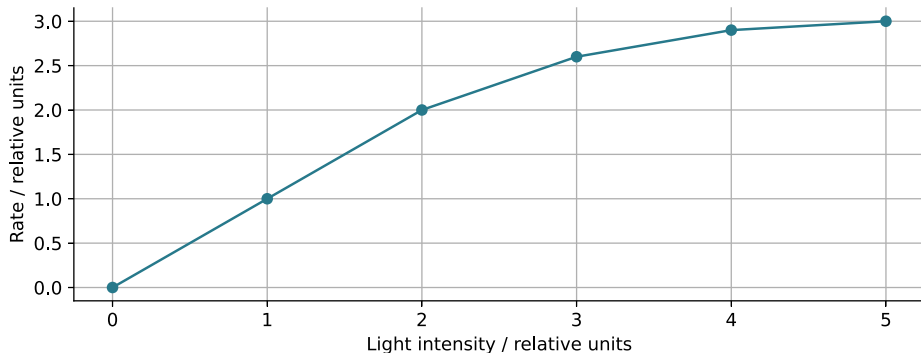
All oxygen bubbles have exactly the same volume. This claim is false: Moving a lamp changes light and may also change temperature. A photosynthesis experiment needs control of heating, not just a ruler.

Photosynthesis · 5.3

Reasoning

Photosynthesis and limiting factors: Change only one factor when testing a limiting factor. At low light, extra light may increase rate. At a plateau, the changed factor is no longer the main limit in that range; the graph alone does not identify which other factor is limiting.

Photosynthesis · diagram



- Original teaching diagram: Photosynthesis and limiting factors
- Use the labels and the stated model together.

Photosynthesis · original transfer

Your turn

A fictional plant produces 8 cm^3 in 4 min at low light and 12 cm^3 in 4 min at high light. Explain the change, and why an unchanged rate after a further light increase would not identify the next limiting factor.

Photosynthesis · transfer reasoning

Method and interpretation

Rates 2 and 3 cm^3/min , a 50% increase. A plateau suggests another limitation under those conditions, but does not identify it. Control temperature and carbon dioxide, allow equilibration and repeat.

Check yourself

- Explain photosynthesis using the stated model.
- Explain limiting factor using the stated model.
- Change one value in the original transfer; explain which assumption still matters.