

Required Practical Photosynthesis Light

GCSE Biology · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Identify the independent, dependent and two control variables. (4 marks)

Step 1 · Independent

Light intensity, changed by moving the lamp (distance from lamp).

Step 2 · Dependent

Rate of photosynthesis, measured of oxygen per minute (or volume of gas per minute).

Step 3 · Controls

Any two: temperature of water; CO₂ concentration (same sodium hydrogencarbonate solution); same piece of pondweed; same lamp and bulb; length of time counted.

Answer: IV: light intensity (distance); DV: bubbles per minute; controls: e.g. temperature and CO₂

Check: Temperature is the hardest control because lamps give off heat.

2. Now try one with the steps

Explain why the pondweed is left for 5 minutes at each new distance before counting. (2 marks)

Step 1 · Adjust

Step 2 · Effect

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Name the gas in the bubbles released by pondweed in light. [1]

2. Why is sodium hydrogencarbonate added to the water? [1]

3. State how light intensity is changed in this practical. [1]

4. Suggest why a beaker of water or an LED lamp is used. [1]
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5. A student recorded 48 bubbles per minute at 10 cm, 26 at 20 cm and 4 at 50 cm. Describe the trend. [2]
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6. Give one reason why counting bubbles is not very accurate. [1]
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7. Suggest a better way to measure the volume of gas produced. [1]
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8. Calculate the relative light intensity at 30 cm using $10\,000 \div d^2$. Give your answer to 3 significant figures. [1]
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9. Counts at 30 cm were 11, 12 and 13 bubbles per minute. Calculate the mean. [1]
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10. Explain why the room should be darkened. [1]
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11. Explain why the bubbles might still be produced for a short time after the lamp is switched off. [1]
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12. Calculate how many times greater the light intensity is at 15 cm than at 45 cm. [2]
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13. A student collects 3.6 cm^3 of oxygen in 4 minutes. Calculate the rate in cm^3 per minute. [1]
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14. Explain why plotting rate against $1/d^2$ (light intensity) rather than distance is useful. [2]
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4. Before you hand it in

"The independent variable is the distance, so light has nothing to do with it."

Distance controls light intensity; light intensity $\propto 1/d^2$.

Forgetting that the lamp heats the water

Use an LED or a heat shield and check the water temperature with a thermometer.

Counting straight away after moving the lamp

Wait a set time (e.g. 5 minutes) at each distance before counting.