Testing requirements for starch formation

Student activity • practical and reasoning

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The question

Which comparisons support the requirements for photosynthesis?

Test prepared leaf treatments while staff handle the heated-solvent stages. Keep the original treatment map and actual iodine observations together.

Equipment

- Labelled treated leaves and original treatment maps
- Eye protection, white tiles, forceps and supplied dilute iodine
- Staff hot-water and indirect ethanol-bath equipment; no flames

Wear eye protection. Staff alone handle hot water, hot ethanol and carbon dioxide absorber. Ethanol is highly flammable: all ignition sources are removed. Pupils handle only cooled, rinsed leaves and dilute iodine. Report splashes and avoid plant sap contact.

Course coverage: Shared Biology / Double Award: 2.23. Starch, light, carbon dioxide and chlorophyll.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Record the teacher's treatment map before testing: light-covered and uncovered leaf areas; green and non-green regions of a variegated leaf; matched plants with ordinary versus reduced carbon dioxide.

2. Check that the plants were destarched before their recorded light treatment. Identify the controls and any differences in humidity, temperature or plant condition.

3. Observe staff softening labelled leaves in hot water, then removing chlorophyll with ethanol heated only indirectly in a hot-water bath. No flame or other ignition source is present.

4. After staff rinse and cool the leaves, place them on labelled white tiles. Wearing eye protection, add supplied dilute iodine and allow the colour to develop.

5. Draw each actual starch-test pattern and compare it with the original treatment map. Use a starch-positive and reagent-negative reference; do not replace a failed result with an expected drawing.

6. Explain the evidence and its limits. Starch distribution supports conclusions about these treatments, while pretreatment, transport of sugars, leaf damage and imperfect controls can affect the pattern.

Cleanup

- Staff collect ethanol separately in a labelled solvent-waste container away from ignition sources.
- Collect leaves and iodine residues as directed; wash hands and clean tiles.

Record your evidence

Blank spaces are for your own work

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Reference and task data

A blue-black iodine response supports starch detection. Record green/non-green and covered/uncovered patterns before decolourising leaves. Starch is a stored product used as evidence; this test does not measure instantaneous photosynthesis rate. The reduced-CO_2 treatment requires a matched control and staff-managed absorber.

Example / trial	Observation / evidence	Explanation / limit
Light comparison: treatment / starch		
Variegation: original / starch		
CO_2 comparison: controls / starch		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Why destarch before the light treatment?

2. Why remove chlorophyll?

3. Why heat ethanol indirectly without flames?

4. What comparison tests light availability?

5. Why must variegated regions be mapped beforehand?

6. Give one limitation of the reduced-carbon-dioxide comparison.