



Photosynthesis: How Plants Make Food

YEAR Year 8

SUBJECT Science

DURATION 45 min

🎯 Objectives

- Describe photosynthesis as the process by which green plants make glucose using light energy.
- Identify the reactants and products of photosynthesis, including carbon dioxide, water, glucose and oxygen.
- Use a word equation to represent photosynthesis.
- Explain how a simple investigation can provide evidence that light is needed for photosynthesis.

🔧 Materials

- Fresh variegated leaf or two leaves from a healthy plant
- Desk lamp or bright window
- Opaque black paper and paper clips
- Boiling tube or heatproof beaker
- Kettle or hot water supplied by the teacher
- Ethanol in a water bath, prepared and handled by the teacher
- Iodine solution in a dropping bottle
- White tile
- Forceps
- Safety goggles
- Photosynthesis word-equation cards
- Mini-whiteboards and pens
- Exit tickets

🕒 Warm-Up

Starter - Display a healthy plant in a sunny classroom and ask pupils to write two ideas on mini-whiteboards: what the plant takes in from its surroundings and what it makes. Collect a few suggestions, then distinguish between **food made by the plant** and substances absorbed or released.

🧩 Activities

1 🍃 Phenomenon and prediction 6 min

Show a leaf with part of its surface covered by opaque paper. Ask pupils to predict what will happen if the leaf is tested for starch after several hours in bright light. Pupils justify their prediction using the idea that light may be needed to make food. Explain that the teacher will use a prepared leaf or a result sample because the full decolourisation process takes longer than this lesson. Safety note: pupils must not handle hot water, ethanol or iodine unless specifically directed; goggles are required.

2 The photosynthesis process 8 min

Pupils examine a diagram of a green leaf and annotate where **carbon dioxide** enters, where **water** arrives, and where **oxygen** leaves. The teacher briefly introduces chlorophyll as the green substance that absorbs light energy. Pupils then explain to a partner why a plant needs both light energy and chlorophyll.

3 Word-equation card sort 9 min

In pairs, pupils arrange cards to form the word equation: **carbon dioxide + water** -light energy and chlorophyll-> **glucose + oxygen**. They identify the reactants and products, then copy the completed equation into their exercise books. Challenge pupils to explain why light and chlorophyll are conditions rather than products.

4 Starch evidence investigation 10 min

Provide pupils with a prepared leaf showing the iodine test results, or demonstrate the final stages using a leaf that has been exposed to light with part covered. Pupils observe the **blue-black** area and the yellow-brown area on a white tile, record the results in a table, and decide which area contains starch. Discuss why starch is useful evidence that glucose has been made, while making clear that the test does not directly test for glucose. Safety note: iodine stains and can irritate skin; ethanol is flammable and must be heated only in a water bath by the teacher.

5 Apply and explain 7 min

Pupils answer two increasingly demanding questions in their exercise books: first, explain why a plant kept in darkness cannot make glucose at the same rate; second, explain why a variegated leaf may produce starch only in its green areas when exposed to light. Pairs compare explanations and improve them by adding the terms **light energy**, **chlorophyll** and **starch**.

6 Plenary and exit ticket 5 min

Plenary - Pupils complete an exit ticket: write the word equation for photosynthesis, name one reactant and one product, and explain what the iodine result shows about the covered and uncovered parts of the leaf. Invite one pupil to use a mini-whiteboard to correct a deliberately incomplete equation.

Assessment

Use questioning during the card sort and annotation task to check whether pupils distinguish reactants, products and conditions. Collect the exit tickets and mark for three features: an accurate photosynthesis word equation, correct identification of carbon dioxide or water as a reactant and glucose or oxygen as a product, and a clear explanation that the blue-black iodine result indicates starch, providing evidence that photosynthesis has occurred. Address confusion between glucose and starch in the next lesson or through targeted questioning.

Homework

Draw and label a simple leaf diagram showing carbon dioxide entering, water arriving, oxygen leaving and light energy being absorbed. Add the photosynthesis word equation and write one sentence explaining why a leaf needs chlorophyll.