Light and pondweed gas production

Teacher / technician

YEAR 10 / LESSON 28 / BIOLOGY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Bubble rate is a qualitative proxy for net gas evolution, not a calibrated gross photosynthesis rate.

Coverage and delivery

Shared Biology / Double Award: 2.20 and 2.23. Light intensity and oxygen evolution.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Booklets / eye protection for gas demonstration	1 per learner	30
Pondweed shoots	1 per pair	15 plus spares
Beakers / lamps / rulers / timers	1 of each per pair	15 sets
0.2% hydrogencarbonate solution	100 cm^3 per pair	1.8 dm^3 including spare
Thermometers	1 per pair	15
Gas demonstration set	funnel, collection tube, water vessel, splint	1 staff setup

Immediate safety

Keep electrical equipment and cables away from water. Do not handle pondweed with uncovered cuts; wash hands afterwards. Staff trim shoots and carry out any glowing-splint demonstration away from pupils and flammable materials.

Preparation and delivery

Read alongside the student method

YEAR 10 / LESSON 28 / BIOLOGY + SCIENCE (DOUBLE AWARD)

1. Select a locally permitted oxygenating aquarium plant and pilot visible gas production under the actual lamps. Staff trim shoots under water and provide consistent lengths; protect attached small animals.

2. Prepare one batch of 0.2% sodium hydrogencarbonate solution and keep solution volume consistent. Pilot temperature control and use LEDs to reduce heating.

3. Set up a separate larger pondweed collection to accumulate enough gas for a staff glowing-splint test. If insufficient gas is obtained, record the limitation; do not claim that counting identified oxygen.

4. Provide a safe electrical layout and keep flame/splint work completely separate from ethanol-based leaf tests.

Close of lesson

- Return pondweed to the designated aquarium or biological-waste route; do not release it outdoors.
- Return solution as directed, dry the bench and wash hands.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

YEAR 10 / LESSON 28 / BIOLOGY + SCIENCE (DOUBLE AWARD)

- Light availability, varied through lamp distance; bubble count per minute.
- Shoot size/species, solution concentration, temperature, observation time and background light.
- 14 bubbles min^{-1}.
- Some lamps also warm the water; temperature itself affects the process.
- Another factor, such as carbon dioxide supply or temperature, may limit the rate.
- Variable bubble size; gas dissolution; respiration; bubbles do not identify their composition.

References and provenance

Pearson Biology specification

Practical Biology: factors affecting photosynthesis

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.