Light

The Oxygen Makers

Overview

Have you ever wondered why plants grow better in some places than in others? In this lesson, you will explore how light intensity affects the rate of photosynthesis—the process plants use to make their own food. Using databot's illuminance sensor and live aquatic plants, you will measure how changes in light influence oxygen production, giving you a real-time look at photosynthesis in action.

Background

Photosynthesis is one of the most important biological processes on Earth. It allows plants, algae, and some bacteria to convert light energy into chemical energy in the form of glucose. During this process, plants also release oxygen, which supports life for almost all organisms—including humans. Light plays a critical role in photosynthesis. When light strikes the chlorophyll inside plant cells, it provides the energy needed to split water molecules and produce oxygen. The intensity of light directly influences how quickly these reactions occur. For example:

- In bright light, plants usually photosynthesize faster, producing more oxygen.
- In low light, photosynthesis slows down because there is not enough energy to drive the reaction.
- When light is too intense, some plants may even protect themselves by reducing their photosynthetic activity.

By measuring illuminance (light intensity) with databot, you can precisely observe how different lighting conditions affect the photosynthesis rate. The oxygen bubbles produced by aquatic plants serve as visible evidence of this process.

Grades: Middle School
Time: 45 Minutes
Subject: Life Science
Topics: Illuminance, Photosynthesis

What You Will Need/Prep

- databot
- IOS/Android Smart Device
- Install Vizeey™ on your Smart device.
- Aquatic plants (Elodea, Vallisneria)
- A transparent container with water
- A powerful light source
- A ruler

- Test your databot™ connection.
- You will be prompted to select and connect to databot™ each time you launch an experiment.
- If there are two or more databot™'s listed, the one closest to your device will be highlighted in blue.
- Study the background information and terms and prepare to explore!

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Through this experiment, students will gain a deeper understanding of how plants use light to grow and how environmental conditions can shape their ability to survive.

Learning Objectives

By completing this lab, students will:

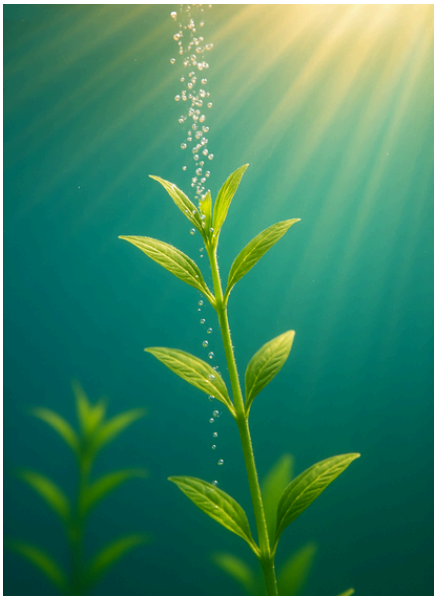
- Use databot to measure light intensity near the plant
- Observe oxygen release from aquatic plants under different light conditions
- Understand the relationship between photosynthesis and oxygen production
- Analyse how changes in light affect the rate of photosynthesis

Important Terms

- **Photosynthesis:** the process in which plants use light to create energy rich compounds.
- **Light intensity:** the amount of light available to the plant.
- **Oxygen release:** visible gas bubbles produced during active photosynthesis.
- **Aquatic plants:** species that live fully or partly in water and exchange gases through their tissues

Interesting Fact

Aquatic plants can create tiny trails of oxygen bubbles that rise like silver strings through the water. Each bubble is a direct result of sunlight being transformed into energy inside the plant. In bright light a single healthy stem can release dozens of bubbles every minute which makes the process of photosynthesis visible to the human eye as if the plant is quietly breathing under water.



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Using Vizeey

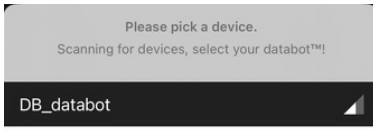
In order to work with the experiment you need to launch the Vizeey application and click on + in the upper right corner.

Then select “Add experiment from QR code” and scan the QR code prepared for this experiment. Your experiment will appear in the list.

vizeey™
https://vizeey.com

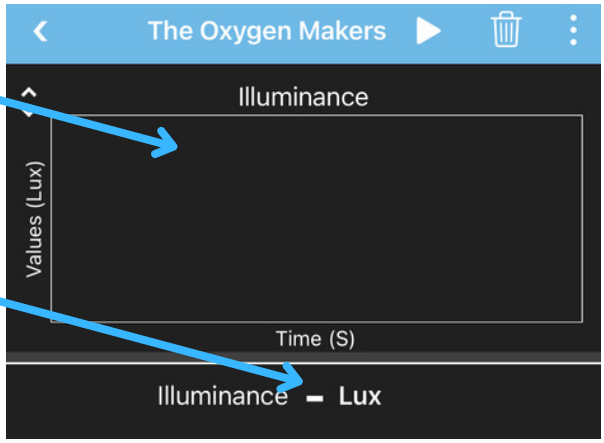
Once in the Experiment

When you start the experiment you will be immediately offered to connect to your databot. Make sure that databot is turned on and in Vizeey mode with a blue blinking light.



This lab work investigates the humidity sensor

- Graph showing the illuminance
- Illuminance value in real-time.



Databot will be used to measure the light coming from the lamp during the experiment. Its built in light sensor detects the intensity of illumination in real time and shows how much energy is available for the plant to perform photosynthesis.
By placing databot at different distances from the lamp, students can observe how changes in measured light levels influence the amount of oxygen the plant produces.

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Part 1: Initial Observations and Discussion Questions

Where do you expect oxygen bubbles to appear first on the plant?

_____

How do you think the intensity of light will influence the amount of oxygen produced?

_____

_____

How might the temperature of the water or the clarity of the container affect your results? _____

_____

Part 2: Hypothesis

Before starting the experiment, write your prediction about how light intensity will affect the plant's oxygen production.

I think the plant will produce more or fewer oxygen bubbles when the light is _____ because _____

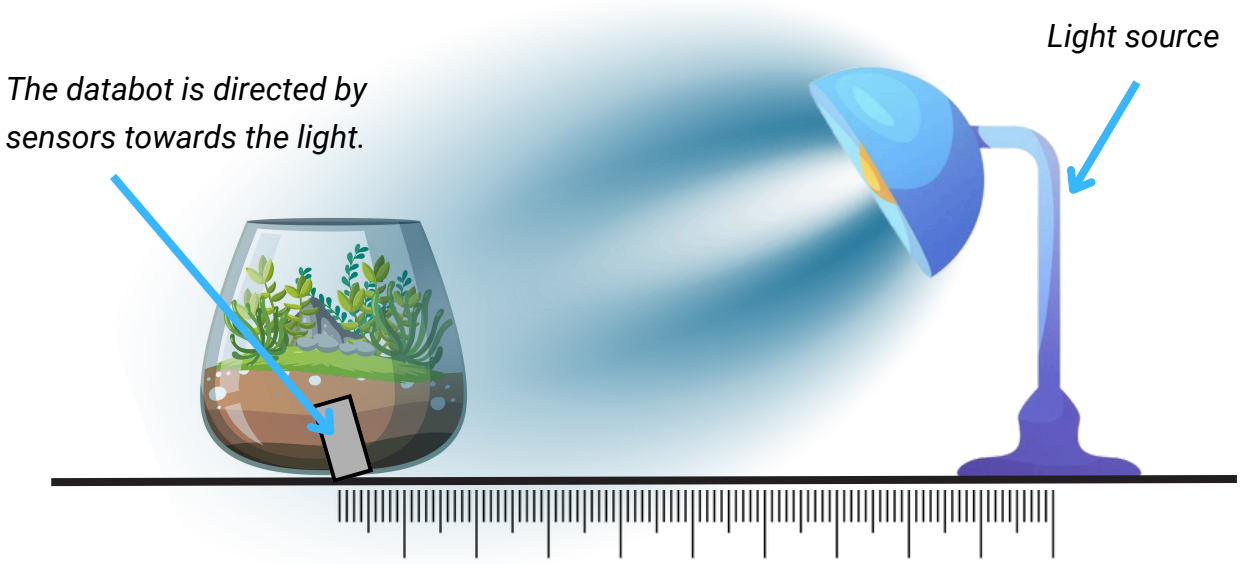
I believe the strongest oxygen release will appear near the _____ because _____

When the light source is moved farther away, I expect the number of bubbles to _____ because _____

The best results are achieved when the plant is placed in clean, fresh water. Clear water provides the essential minerals and conditions that support healthy photosynthesis, allowing the plant to release oxygen bubbles more visibly and consistently.

Part 3: Experiment Procedure

- Fill a transparent container with clean water and place an aquatic plant inside.
- Place the databot near the container.
- Turn on databot (using the small button on the left side)
- Tap on " **The Oxygen Makers**" in Vizeey to load the experiment.
- You will be prompted to connect to databot.
  - Hint- if there is more than one databot in use, the one closest to you will be in blue!
  - A solid blue light on databot means you are connected.
- Start your experiment using:
  - Use these icons at the top of the screen in Vizeey to start and to pause the experiment.
- Place the light source at a fixed distance from the plant and allow the system to stabilize for one minute.
- Place the Databot near the plant and record the light intensity readings and the distance of the light source from the plant.



- Time the experiment from the start.
- Observe the plant carefully. Look for oxygen bubbles forming on the leaves or roots.
- Count the number of bubbles released at thirty-second intervals for several minutes.
- Increase or decrease the distance to the light source and repeat the measurements.
- Record all data in a table and compare how light intensity affects oxygen production.

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Leaf Type Used	Time of First Bubble Appearance	Light Intensity (lux)	Distance from Light Source (cm)	Number of Bubbles per Minute

You can also repeat the experiment using different plant species. Each plant perceives oxygen differently. You can study them.

Part 4: Concept Questions

Which part of the plant released oxygen most visibly and why do you think this happened?

Why is measuring light with databot important for analysing the plant's oxygen production?

How did light intensity influence the number of oxygen bubbles produced by the plant?

Would you expect all aquatic plants to produce the same number of bubbles?

Part 5: Reflection

1. Describe what surprised you most during the experiment.

2. Think about environmental factors that may have influenced your data.