



Key Stage 3/4 Lesson 1 – Super Seagrass

Practical activity – Investigate the rate of photosynthesis

Introduction

Seagrass is a marine flowering plant that photosynthesises to produce its own food to create vast underwater meadows. Photosynthesis is a chemical reaction and numerous factors can affect the rate of the reaction. The rate of photosynthesis can be measured by counting the number of bubbles of oxygen released by pondweed. In this experiment, you will investigate the effect of light intensity on the rate of photosynthesis in pondweed, another aquatic plant like seagrass, by moving a lamp closer or further away.

Safety: Take care when using water near electrical equipment. Ensure your hands are dry before using the lamp.

Aim

To investigate the effect of light intensity on the rate of photosynthesis.

Apparatus

- A 5-7cm piece of pondweed
- A test tube
- Test tube rack (one that allows light to pass all the way through it)
- Lamp with an LED bulb (so that the lamp will not increase the temperature of the water)
- Meter ruler or a measuring tape
- Stop clock or timer
- Water
- Scissors (in case you need to cut the pondweed stem)

Setting up the equipment

- 1) Set up your experiment in a dark room.
- 2) Approximately fill a test tube halfway with water.
- 3) Place a piece of pondweed into the test tube, with the stem facing up. Carefully push the pondweed into the test tube so as not to snap the stem.
- 4) Top up the test tube with water so that water covers all the pondweed and place the test tube into the test tube rack.
- 5) Put the test tube rack and lamp onto a surface. Attach the ruler or measuring tape to the surface so that you can move the lamp along it.
- 6) Bubbles of oxygen should be seen being produced by the pondweed after a couple of minutes. If not, cut the end of the stem of the pondweed.

Method

- 1) Place the test tube rack with the pondweed in the test tube at 0cm on the ruler.
- 2) Place the lamp as close as you can to 0cm so that it is shining on the test tube.
- 3) Allow the plant to adjust to the light for two minutes.
- 4) Count the number of bubbles of oxygen being produced by the pondweed in one minute.
- 5) Record your results in a table (such as in the example below). Repeat steps 1-4 and record your results.
- 6) Repeat steps 1-5 but place the lamp at 30cm away from the test tube rack, then at 60cm away and then at 90cm away (or whichever distances you decide to use in your experiment).
- 7) Work out the average number of bubbles produced in a minute for each distance.
- 8) Plot your results in a graph.



Example table

Distance of lamp from plant (cm)	Number of bubbles of oxygen produced per minute		
	Test 1	Test 2	Average
0			
30			
60			
90			

Questions

- What happened to the number of bubbles of oxygen being produced as the lamp was moved further away? Why did this happen?
- What were the independent, dependent and control variables?
- How could you make your experiment more accurate?
- How could you make your experiment more reliable?
- What factors other than light intensity affect photosynthesis?

