Practical Guide
Biology
Photosynthesis

This document contains:

- Links to YouTube clips showing the practical procedure
- Information from examination boards AQA, OCR, Edexcel
- Potential examination questions and answers

Commissioned by The PiXL Club Ltd. November 2016

Required practical – exam boards

- AQA

Required practical activity	Apparatus and techniques
Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.	AT 1, AT 3, AT 4, AT 5

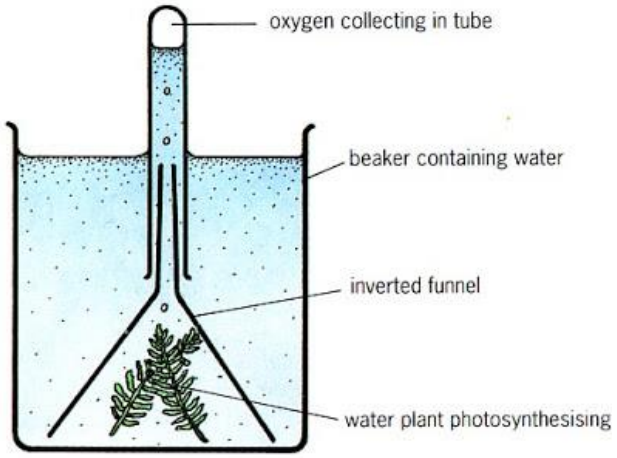
- Edexcel

6.5	*Investigate the effect of light intensity on the rate of photosynthesis*	Algal balls (or similar) must be set up and placed at varying distances from a light source to investigate the effect of light intensity on the rate of photosynthesis. The rate must be measured and compared to the distance away from the light source.

- OCR **PAG 5: Photosynthesis**

  Investigate the factors that can affect the rate of photosynthesis on *Cabomba*.

Practical procedure: Photosynthesis

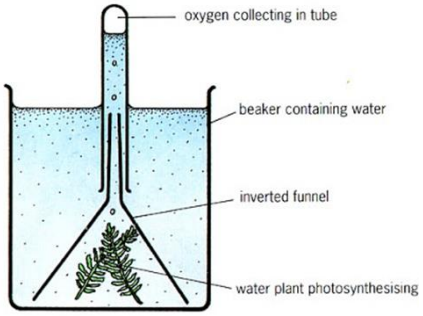


Video 1

Video 2

Possible examination style questions

A student carried out an investigation into the effect of light intensity on the rate of photosynthesis.



1. Plot a graph of the results:

Distance from lamp/ cm	10	20	30	40	50	60	70
Number of bubbles of gas per min	82	43	20	12	8	6	2

2. Describe how a student would use the equipment in the diagram to gather this data.
3. Describe and explain the pattern in the data.
4. Identify 2 sources of possible error with the collection of data in this manner. Suggest improvements.

Possible examination style questions answers

1. Plot a graph of the results.

ANS:

- **Appropriate scales**
- **Labels on axes**
- **Points plotted correctly**
- **Suitable line of best fit**

Possible examination style questions answers

2. Describe how a student would use the equipment in the diagram to gather this data.

ANS:

- **Equipment set up at suggested distance e.g. 10cm from lamp**
- **Time for pondweed to acclimatise**
- **Count number of bubbles produced in a minute**
- **Repeat at different distances outlined in table**

Possible examination style questions answers

3. Describe and explain the pattern in the data.

ANS:

- **Increasing distance from lamp decrease the number of bubbles**
- **Dramatic decrease between 10-20cm from lamp**
- **Increase distance from lamp decreases light intensity**
- **Decreasing light intensity leads to a decrease in rate of photosynthesis**

Possible examination style questions answers

4. Identify 2 sources of possible error with the collection of data in this manner.

ANS:

- **Lamp producing heat as well as light**
- **Place beaker of water in between the light source and pondweed**
- **Miscounting bubbles**
- **Repeats to reduce impact of outliers**
- **Any sensible**

Key questions:

- How can light intensity be measured?
- How can light intensity be calculated?
- What is the optimum temperature for this investigation?
- What are the other variables that need to be controlled during the investigation?
- Why does algae work better than pondweed in this type of investigation?
- What are the benefits of using immobilised algae?
- Why does the rate of photosynthesis lead to a colour change in the indicator solution?
- Why is a tube of water placed between the light source and the tubes of indicator containing the algal balls?
- Why is a set of standard solutions used?

http://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/GCSE-9-1-Sciences-core-practical-guide.pdf

Summary document

A summary document is also available on Huddle which contains all the relevant information about this practical from the different examination boards. This document includes practical methods and other potential examination questions