

## How does the amount of Light affect the amount of oxygen bubbles produced in sodium carbonate solution?

### Aim

In this investigation is to see if when there is more light shining onto some pondweed in sodium carbonate solution it affects the amount of bubbles produced from the pondweed.

### Background information

Photosynthesis is a chemical reaction occurring in the leaves of green plants. Using the energy from sunlight, it changes carbon dioxide and water into glucose and oxygen.

Certain things will limit photosynthesis from photosynthesising quickly.

One of these things is light. A plant can have lots of carbon dioxide and water but if it doesn't have enough light it won't work.

### Equation for Photosynthesis

Carbon Dioxide + Water + Light Energy → Glucose + Oxygen

### Balanced Equation for Photosynthesis

$6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Light energy} \rightarrow (\text{chlorophyll}) \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}$

For photosynthesis to take place a plant must have enough Carbon Dioxide, Water and Light.

When photosynthesis occurs Glucose and Oxygen are produced.

### Hypothesis

I think that when the lamp is closer to the pondweed more oxygen bubbles will be produced. I think this because when light is increased photosynthesis occurs quicker which means more oxygen bubbles will be produced.

### Method

#### Equipment:

- Pondweed
- Light
- Measuring cylinder
- Conical flask
- Boiling tube
- Metre rule

- 1) Put a 10cm long piece of pondweed into a boiling tube with 30ml of sodium hydrogen carbonate solution. We are using this because it contains a controlled amount of carbon dioxide
- 2) Put the boiling tube inside a conical flask containing 250mls of water, which will act as a shield from the heater that the light bulb gives off then place the conical flask at 50cm away from the light.
- 3) Turn the light on for one minute and count the amount of bubbles that are given off from pondweed. Repeat this three times using the same light, same distance, same position and same pondweed. Record all the results and work out the average. This gives a correct view of the results and so I can see if the is a wrong result.
- 4) Repeat step three at the distance on 10cm, 20cm, 30cm and 40cm making sure that the position, pondweed and light all stay exactly the same.

The variables are the amount of light intensity, the amount of carbon dioxide and the amount of water.

### **Diagram**

### **Table of Results**

Distance (cm)	number of bubbles of oxygen (per minute)			
	1	2	3	Average
50	5	5	5	5
40	7	5	7	6.33
30	8	8	7	7.66
20	0	11	10	10
10	13	14	15	14

## **Conclusion**

My graph and results show me that the further the lamp is to the pondweed smaller the amount of oxygen bubbles produced and the closer the lamp is to the pondweed the more oxygen bubbles produced. As shown by the graph the results drop down quite quickly and there is quite a difference between each one.

This shows that the more light the faster photosynthesis happens.

By increasing the light and the heat it photosynthesised quicker.

My conclusion supports my original prediction because it shows how more oxygen was produced (hence the bubbles) showing the speed of the reaction.

## **Evaluation**

I think my results are quite accurate. They show how the heat and the light affected the photosynthesis

There are a couple of anomalous results. But I still think they give a clear indication of my conclusion. These anomalous results could have happened because we may have missed some oxygen bubbles.

There is one way in which we could have done our experiment differently. We didn't use a heat shield and the results we got could have been affected by the heat changing.

I think my method was suitable I think it proved my hypothesis well. I think to make my results more accurate I could have made sure the light was in the same position each time because it changed slightly each time we moved it. Also I could have moved the light right away from the pondweed e.g. 100cm away from the pondweed to see if the pattern carries on.

Also to get more varied results I could have tried a different amount of time in which to count the bubbles e.g. 2 minutes.

But over all I think I got pretty accurate results, which still showed the pattern that happens when, photosynthesis occurs.

