

## Biology

Harry Whalley

### Photosynthesis Lab

Photosynthesis is a chemical reaction, which uses the energy of light. It can be measured by the amount of gas is produced. In aquatic plants it converts the  $\text{CO}_2$  in the water to oxygen, this then bubbles to the surface. It is possible to measure the amount of bubbles as a rate of photosynthesis.

#### Hypothesis:

As Photosynthesis needs light, I predict that as the light intensity goes up the rate of Photosynthesis will also go up, however I am not sure if it is directly proportional.

#### Method:

A shoot of Elodea plant was cut at the non-growing end and then put into a boiling tube with the cut end facing upwards. Pond water was then added to the boiling tube as well as some extra  $\text{CO}_2$ . The boiling tube was then placed into a beaker of water. A metre ruler was placed onto the desk with 0 dead centre of the flask. A lamp was placed at distance  $x$  from the beaker. This distance was measure to the front part of the bulb head. This setup was left for 5 minutes to equilibrate. Distance  $x$  was set and the number of bubbles released from the plant in 2 minutes was recorded. This was repeated 3 times from each distance to find the average.

#### Results:

Distance	No. Bubbles	Temperature	Ave No. Bubbles
316mm	3, 2, 2	20	2.3
182mm	8, 8, 7	21	7.5
129mm	7, 7, 7	21	7
10mm	13, 10	25	11.5

See chart.

Other observations,

The bubbles coming of the leaf were big.

Some bubbles caught on a leaf above it, forming a bigger bubble which when rising to the surface only counted as one.

Evaluation:

My prediction is true; the rate of Photosynthesis does go up with the light, however there is a dip. I think that this may be due to one of the factors that could have had an effect on the experiment.

The main factor was the size of the bubbles; they were large and did not rise at even time intervals (this would have suggested even volumes of gas) this also meant that fewer bubbles rose and that made it less accurate. If I started the 2-minute count down as a bubble was just forming or as it was just about to rise it could change my result by a few bubbles. (quite a lot of gas considering the size of the bubble) this is why it would have been more effective to measure the volume of gas escaping by trapping it.

Other less important factors may have been a change in other lighting, for example the sun going in. For a more accurate study it should have only been one light source.

The amount of CO<sub>2</sub> in the water must have decreased as the plant converted it to Oxygen. This may have affected its performance.

Conclusion:

Light intensity does effect the rate of Photosynthesis in a plant, however I think that the experiment could not quantify this rate because it was too inaccurate and had too many sources of error