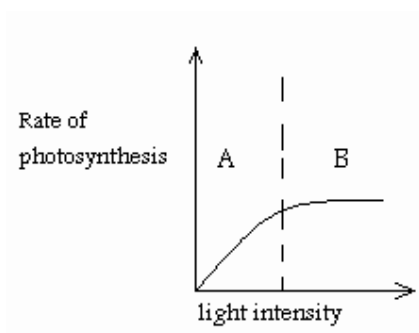


Experiment to show the rate of photosynthesis

Aim: Experiment to show the rate of photosynthesis when pondweed is under different light intensities.

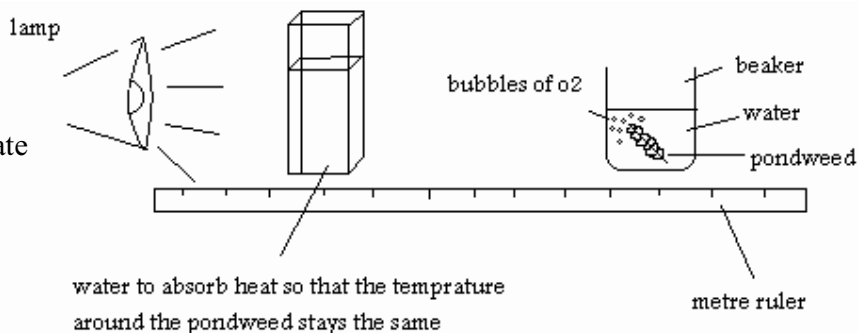
Prediction: I predict that the closer the light is to the pondweed the (or the higher the light intensity) the more oxygen will be produced until a certain point where the temperature or carbon dioxide levels will be the limiting factor. The further away the light, the slower the oxygen bubbles will be produced so the less light the less photosynthesis will occur which is needed for the plant to make food.



The rate increases (A) but only to a certain extent. Then they don't increase any more because of the other limiting factors of the carbon dioxide levels and temperature.

Method:

- ❖ Lamp
- ❖ Sodium Hydrogen Carbonate
- ❖ 1 Meter Ruler
- ❖ Water
- ❖ Beaker
- ❖ Stopwatch
- ❖ Pondweed
- ❖ Measuring Cylinder
- ❖ Scales



- ✚ Set up apparatus like above with the light source 5 cm from the beaker and cut the end of the pondweed.
- ✚ Some potassium hydrogen carbonate might have to be added which provides carbon dioxide for the plant which is needed for photosynthesis. Then wait for the plant to 'acclimatise'.
- ✚ Count the number of bubbles seen in 1 minute which is a way of measuring the rate of photosynthesis.
- ✚ A row of dots on paper while counting can represent each bubble counted.
- ✚ Move the light 10cm away. Wait 2 minutes and then count the bubbles again.

- Repeat this at 15cm, 20cm then 5cm intervals until the bubbling stops and repeat each measurement twice to get a more accurate result and find the average.

Fair Testing:

Changing variable: Light intensity

Variables kept the same:

- Amount of pondweed-
Why: More pondweed, the higher the rate of photosynthesis
How: Weigh pondweed with scales
- Water to absorb heat distance
Why: Closer or further means temperature differs around the pondweed
How: Keep water 2cm away from beaker at all times
- Amount of KHCO_3 added
Why: The CO_2 provided can affect the rate of photosynthesis
How: One scapula full put in to the water with the pondweed every time
- Dark room or same light around the pondweed other than the lamp
Why: If more light is focused on the pondweed the rate of photosynthesis will be increased and it will not be a fair test.
How: Investigation to take place in dark room

Results:

Test 1

Distance (cm)	Bubbles
5	14
10	9
15	6
20	5
25	3

Test 2

Distance (cm)	Bubbles
5	14
10	7
15	7
20	5
25	4

Distance (cm)	Avg. Bubbles
5	14
10	8
15	6.5
20	5
25	3.5

Conclusion: The most bubbles were produced when the light intensity was 5cm away from the pondweed which means more oxygen is produced which suggests that the more light focused on the pondweed the more photosynthesis will occur and the photosynthesis occurred very fast on that measurement which also proves my prediction was correct. When 10 cm away from the lamp photosynthesis was still occurring as quite a few oxygen bubbles were being produced but not as much as when the pondweed was closer to the light source. Less bubbles were produced in the 15cm test due to the fact that there was less light and therefore less photosynthesis so less oxygen is produced. This pattern continued as the light involved in the photosynthesis process decreased less bubbles were produced 20cm, and 25cm away.

Evaluation: The results from the 5cm tests were equal which shows that the results were right with an average of 14 bubbles per minute. The results for the 10 cm test were close with an average of 8 bubbles/minute. The 15cm one was very close too, in the first test 6 bubbles were counted and then 7 bubbles in the next test which makes them about right with an average of 6.5 bubbles/minute. The oxygen produced for both tests for the 20cm distance were the same which shows that the results were correct. The 25cm distance was also close and had an average of 3.5 bubbles per minutes which shows that all of my results were pretty much correct and less oxygen is produced when the light source goes further away. There were also no major anomalies but a couple of problems were faced during the investigation. The initial pondweed used for some of the experiments did not produce any oxygen so the experiment had to be redone. To improve this I should be using fresh autotrophic pondweed to produce oxygen first time around. Another problem faced was that the distance between the light and the beaker wasn't exactly spot on so to make this a better test the measurements should be taken accurately and marks should be made where apparatus should be placed.