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Rate of Reaction in Photosynthesis

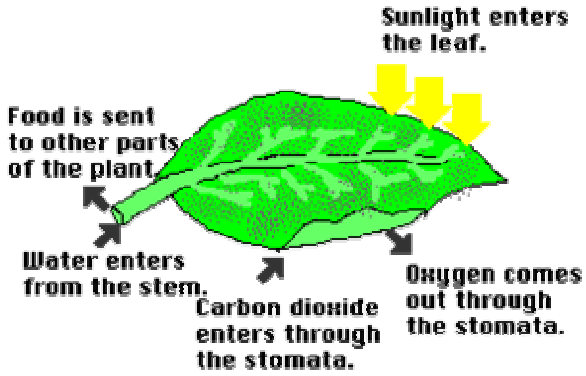
Aim: to find out how the rate of photosynthesis affected by light intensity.

Photosynthesis

Green plants are at the beginning of all food chains. Plants are known as 'producers' because only plants make their own food by building up carbohydrates, proteins and fats from simple inert chemicals.

Green plants need sunlight to produce food. They obtain the sun's light energy using the chlorophyll in their leaves and use it to make a sugar called glucose, which is either used in respiration or converted into starch and stored.

Oxygen is made as a by product of photosynthesis and is released via the stomata. I will be measuring the length of the oxygen bubble produced. The key variables are the concentration of carbon dioxide in water, temperature, light intensity and the amount of water.



Preliminary experiment

Method

- Cut a piece of elodea
- Mix o.5% of sodium bicarbonate into the water.
- Keep the temperature at 20 degrees.
- Change the distance of the light/lamp at 50cm
- Record the amount of oxygen produced every time (ten minutes).

Results

Temperature (degrees C)	Length of oxygen bubble (mm)
10	2.6
20	2.6
30	2.6
40	2.6
50	2.6

I will adapt this experiment to do my actual investigation. I will modify this by changing the light intensity.

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My experiment

Aim: to find out how the rate of photosynthesis affected by light intensity.

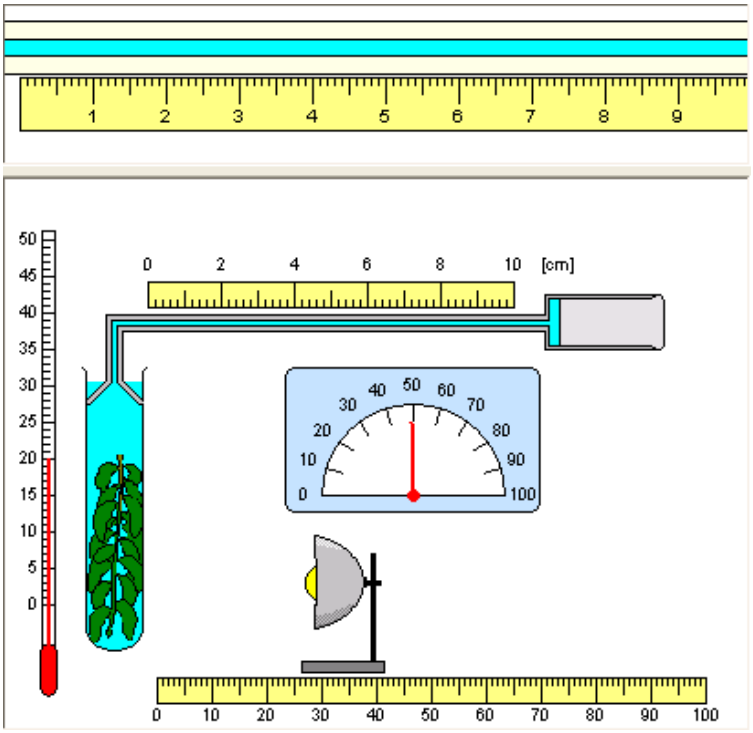
Prediction

I believe the rate of photosynthesis increases when light gets brighter but only up to a point. When a certain light intensity is reached the rate of photosynthesis is constant. It can't go any faster even if the light intensity continues to rise. I know from my own knowledge that this can be the effect of limiting factors such as Sodium Bicarbonate in this case. The reason the rate of photosynthesis will stabilize after a certain point would be lack of other factors such as carbon dioxide. These are known as limiting factors.

Method

- Cut a piece of elodea, mix o.5% of sodium bicarbonate into the water.
- Keep the lamp at 20 degrees.
- Change the distance of the light by moving the lamp back 10cm every ten minutes.
- Record the amount of oxygen produced every time (ten minutes).

Diagram



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Results

Distance from lamp (cm)	Light intensity (%)	1st reading (cm)	2nd reading (cm)	3rd reading (cm)	Average
0	100	4.4	6.2	5.5	5.4
10	77	5.9	5.8	6.2	6.0
20	59	5.8	5.7	5.2	5.6
30	44	5.8	5.6	4.6	5.3
40	34	5.0	4.2	4.9	4.7
50	27	3.3	3.2	3.5	3.3
60	19	3.3	3.2	3.3	3.2
70	15	3.3	2.5	2.8	2.9
80	12	2.5	2.4	2.4	2.4
90	10	2.1	1.9	2.1	2.3
100	7	1.6	1.4	1.7	1.6

Conclusion

My results table shows the rate of photosynthesis increases until 65% of light intensity, then it becomes steady as I predicted. The reason why it stabilises is because that even though there is an increase in the light intensity there will be no increase in the other factors e.g. carbon dioxide and the temperature. These are limiting factors and the plant needs constant supply of all these factors to continue to photosynthesise. On my graph there happens to be one anomalous result, this could be due to a reading error.

For a plant to photosynthesise continuously three factors are required which are temperature, carbon dioxide and light. If I had an equal amount of all three variables then the graph would have shown a constant rise in the rate of photosynthesis however, this wasn't the case and due to lack of the other two factors i.e. temperature and carbon dioxide the rate of photosynthesis stabilized after a certain point.