

## Photosynthesis GCSE Coursework

**Aim:** To investigate how much light intensity affects the rate of reaction.

**Reaction:** photosynthesis of Canadian pondweed (Elodea)

**Introduction-** what is photosynthesis? The definition of photosynthesis is when plants process water and carbon dioxide to produce glucose by the process of photosynthesis. Photosynthesis is the method that plants use to make their own food.

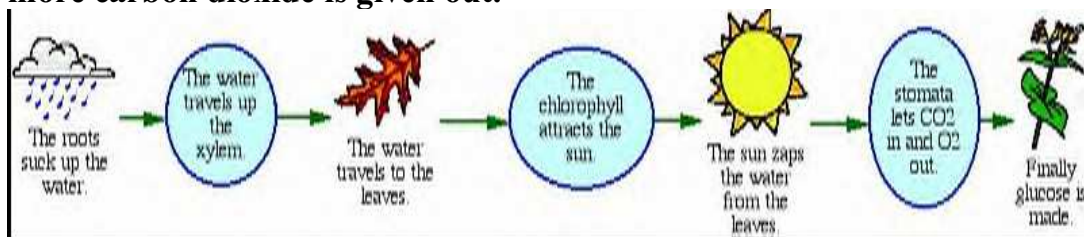
When photosynthesis takes place, plants use the sun's energy to combine carbon dioxide from the air with water from the soil to create glucose (a carbohydrate).

Carbon dioxide + water (+light energy) > glucose + oxygen  
(Simple raw materials) (Carbohydrates food) (By-product)

Mostly photosynthesis takes place in leaves, as leaves are photosynthetic organs they make food. Chloroplasts in the leaf cells have got green pigment chlorophyll, it absorbs light energy, making it available for photosynthesis.

Plants use glucose to provide energy and raw materials. Glucose can be built into starch, which is a food store, or into cellulose for cell walls. Also combined with other nutrients to make amino acid (building blocks of proteins) also built into lipids, which can also be a food store-e.g Sunflower oil.

When plants use light energy in photosynthesis, they also release energy by respiration like animals do to. Photosynthesis only happens when there is sufficient light. Also respiration happens all day and night. In daytime, the balance of photosynthesis and respiration means more oxygen is given out than is taken in. At night, more carbon dioxide is given out.



**Equipment list-** the equipment I will be using for this experiment to see how light intensity affects the rate of reaction are: beaker to put pond water in it, flask to measure how much pond water I'm putting in, cardboard light shield to block any other light coming in to the pond weed, clamp to hold the glass shield in place, lamp to shine the light at the pond weed, glass heat shield to make not all the light from the lamp pass through to the pond weed.

**Fair test-** to ensure that a fair test is carried out the following things must be done. The same pondweed must be used every time we change the light distance. Do the experiment three times for each distance to get an accurate average. There must only be one variable and that is the distance of the light source from the plant. Choose a value for carbon dioxide mixture and keep at the same value all the way through the experiment. Take results after three minutes for each individual experiment.

**Safety-**

Follow lab safety rules (e.g. no running bags at the back etc.)

Keep the desk lamp away from contact with water

Be careful when using scapular.

**Method-** 6 step-by-step instruction guide of how I'm going to carry out my investigation.

1. Place down meter ruler
2. Get lamp and heat shield
3. Get clamp and hold glass heat shield in place
4. Next get the cardboard box light shield and place behind flask and seater
5. Fill flask with 5cm of elodea and water then fill to beaker with the same.
6. Get stop clock and start the experiment from 5cm going up to 35cm doing each measurement 3 times, 4-5 min then measure of the volume of the gas.

**Method Justification:**

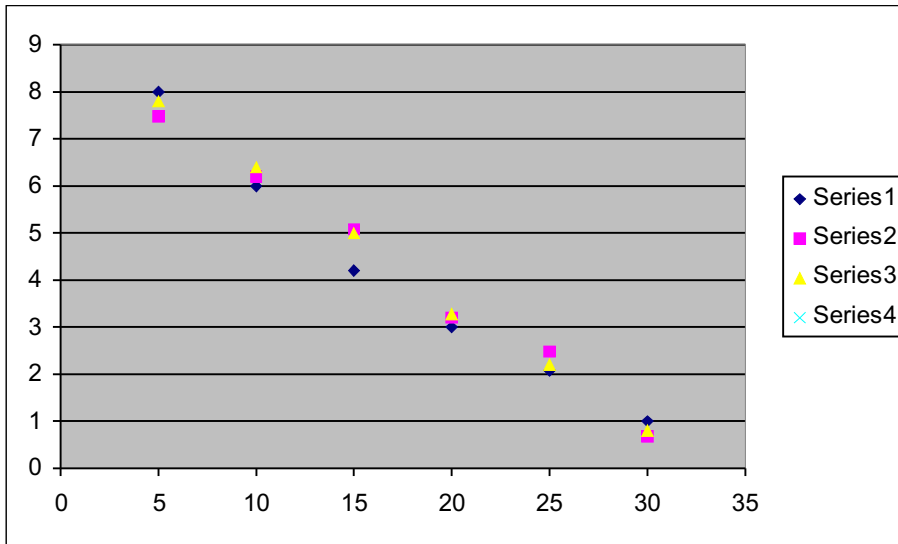
I am calculating the volume of gas instead of counting the number of bubbles that another way of estimating the rate of oxygen production shows how fast photosynthesis is happening. As counting the number of bubbles is not accurate so I'm measuring the volume of gas because it is accurate. I could get distracted counting bubbles after bubbles coming in different volumes, so it wont be a fair test. I am repeating the experiment for each distance because I intend to do a fair test and also I can get an average to put my results into a graph. Also I am shielding the elodea pondweed because the lamp will give out to much heat that will affect the water temperature and this will affect photosynthesis accruing.

**Prediction:**

I predicted that as the intensity of light would increase and also the rate of photosynthesis would increase. My hypothesised is that if the light intensity increase and the rate of photosynthesis will increase at a proportional rate until am certain level is reached, and the rate of increase will then go down. The level will eventually will be reached where an increase in light intensity will have no further effect on the rate of photosynthesis, as there will be another limiting factor, in this case probably temperature.

**Results-**Temperature:      c

Light intensity	Gas produced (mm)			
Distance from the lamp (cm)	Reading1	Reading 2	Reading 3	Average
5	8.0	7.5	7.8	7.76
10	6.0	6.2	6.4	6.2
15	4.2	5.1	5.0	4.7
20	3.0	3.2	3.3	3.16
25	2.1	2.5	2.2	2.26
30	1.0	0.7	0.8	0.83



**Conclusion:** from my results and graph I can conclude that the further the lamp is from the elodea the less gas is produced. The first 10cm it drops from 8 to 6mm, that's 2mm decrease, the pattern is the line going more downer by the mm when the cm is rising.

