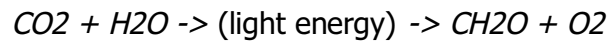


An Investigation Into How Light Intensity Affects The Rate Of Photosynthesis

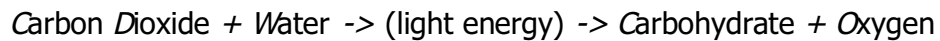
Introduction

I am aiming to research my theory the when light intensity increases on a plant, photosynthesis will also increase at a directly proportional rate, in contrast to the light.

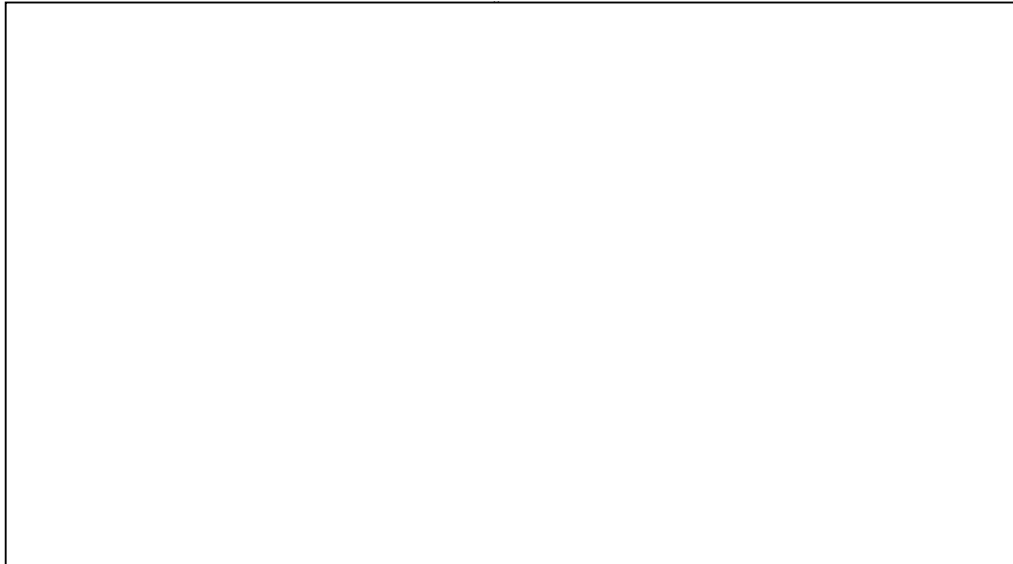
Photosynthesis is the operation in which a plant collects sunlight (or any other light) and traps it in chlorophyll, and is used in the manufacture of a carbohydrate from carbon dioxide and water. This process can be summarized by the equation below:



Or



Light is a source of energy. During photosynthesis, the light photochemically splits water. This provides hydrogen atoms for the reduction of carbon dioxide (CO_2).



Prediction

I predict that the more light intensity that a plant endures, the more photosynthesis will occur. I think this because photosynthesis can increase, and the more light that falls on the plant the more photosynthesis will occur.

I also predict that it will do this in a directly proportional rate. I predict when it gets to a certain point; photosynthesis will stop increasing and will be at a constant rate. This is because light is a limiting factor of photosynthesis.

Apparatus

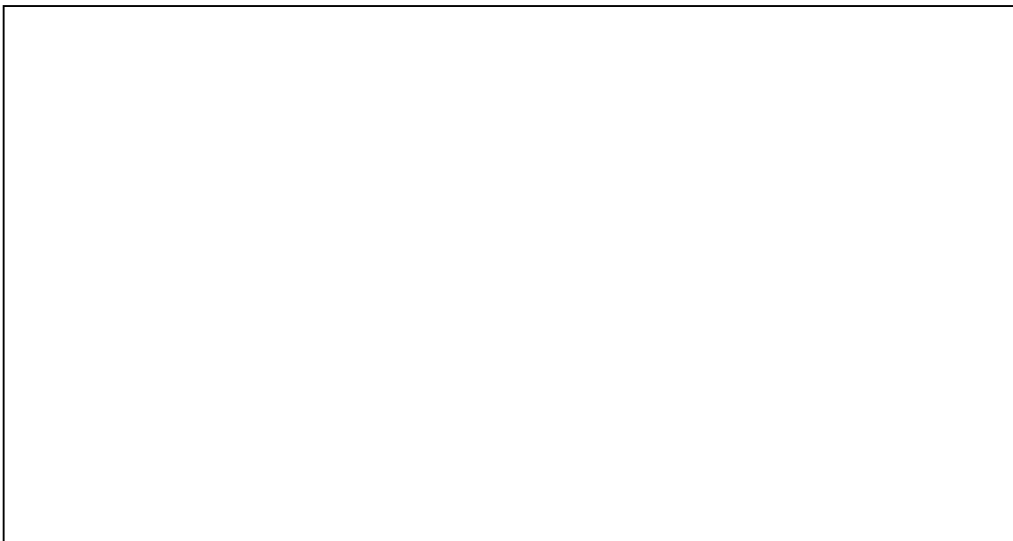
- Pond Weed (elodea)
- Ray box and Power Pack
 - Beaker (300ml)
 - Water (300ml)
 - Thermometer
 - Funnel
 - Test Tube
 - Stopwatch
 - Volt Metre
 - Box

Variables

- Distance of the plant from the light source (light intensity)
 - Amount of O₂/CO₂ present in the air
 - Temperature
 - Amount of chlorophyll in plant
 - Type of plant

Method

I will collect all the apparatus I stated earlier, and set it up as shown in this diagram:



- I will put the water (300ml) into a 300ml Beaker.
- I will let the plant accustom to the light intensity for 2 minutes from the ray box and then count the amount of bubbles for 3 minutes,
- I will do this for a low light intensity and going up to a higher one. I will control this using my power pack voltage measure. I will use the voltages as follows:

VOLTS:

3v

4.5v

7v

9.5v

12v

Fair Test

- Record and Control the temperature
 - Wash all apparatus when finished
 - Control Light Intensity
- Only let light from ray box onto the plant
 - Time using an accurate stopwatch
- I will not interfere with the experiment while the 3-minute test is taking place.

Safety

- Don't run
- Tell people around me that I am starting the experiment
 - Wear goggles
- Tuck tie or extruding clothing out of precarious situations.

Results

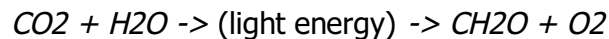
I have collected a set of results shown below:

Voltage	Experiment 1 (bubbles)	Experiment 2 (bubbles)	Experiment 3 (bubbles)	Average (bubbles)
12	52	56	60	56
9	41	42	61 (anomalous)	42
7.5	32	312	32	31
6	20	28	27	25
4.5	14	13	14	14
3	5	8	7	7

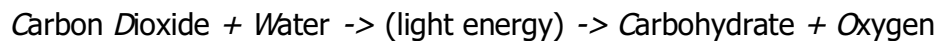
From these results I can come up with a good conclusion.

Conclusion

By analyzing my results I can say that my prediction is correct. The results indeed show that the amount of light intensity and oxygen go up in a directly proportional rate. I can tell this because as I increase the voltage (light intensity), the amount of bubbles increased also (oxygen). They are not all completely accurate but are accurate enough to make a firm conclusion, and say that my prediction is correct. Indeed photosynthesis proved to produce more oxygen as light intensity increased, proving the equation below:



Or



But my prediction that as the light increases eventually the rate of photosynthesis will stop and become constant was not proven, this may be because the light intensity didn't get high enough, or in fact it may be a wrong theory. See my evaluation to see what I could have done.

Evaluation

Overall my experiment could have been better. The problem was the amount of time we had, and the equipment that was used. The equipment could have been more advanced, but as I am in school the equipment is limited, and does not fit that standard. I had to make do with what I had.

There are a lot of ways I could have achieved more accurate results if I were to do this experiment again. Because of recurring temperature changes in the room I could have placed the test tube containing a solution in a water bath to keep it at the same temperature all the way through the experiment, without doing this not-so accurate results would have been made. The stopwatch I was using wasn't of the newest or best quality so I could have used more accurate timing with a more advanced stopwatch. If I had more time I could have used different equipment each time rather than having a test tube or beaker that has a slight amount of water in from just being washed out. This could cause inaccurate results by water changing the water; this would have made an improvement on results if I had taken account to it.

I could use even more accurate measuring cylinders and beakers to obtain even more accurately taken readings. I could make sure I have enough water for the experiment because if I were to use another batch it may be infected or not as concentrated as the one I was previously using.

There was one particular result that was obvious to me of being anomalous (I have pointed this out in the table of results). Counting wrongly, or simply adding too much water may have caused it. Most likely it was because I added too much water.

I found out what I wanted to know, because my results have shown me. With this information in hand, it gives me a much clearer insight on how a plant works and its method in photosynthesising.

To find out more on this subject I could carry out another experiment, such as trying to find out about the same type of thing only with other plants.

I could see if they use the same to photosynthesize in different situations.

Also finding out the speed of which it photosynthesizes.