

Investigate one of the limiting factors on rate of photosynthesis in a water plant

INTRODUCTION

Photosynthesis is the process by which plants make their own food for photosynthesis to occur the plants need sunlight energy, the energy is absorbed by a green pigment called chlorophyll which is found in the leaves. This energy then combines with water molecules from the soil, and carbon dioxide from the air. Then as a result of this a type of sugar called glucose is produced and oxygen is made.

The equation for photosynthesis is



There are certain things that affect photosynthesis and these are called limiting factors. Things like light intensity can affect the rate of photosynthesis- we call them limiting factors.

It doesn't matter if the plant has lots of carbon dioxide and a nice warm temperature. If light is in short supply, then light will limit the rate of photosynthesis

Let's say light intensity is limiting photosynthesis, the only way to increase the rate is to increase the limiting factor. In this case light intensity.

Other limiting factors are carbon dioxide and temperature. But only one factor can limit the rate at any one time. It depends on which one is in the shortest supply.

I will not be testing the rate of photosynthesis in a water plant with carbon dioxide as it is too vague a subject to do and stimata is too difficult. So that leaves me with the choices of heat and light, I think that heat will be hard to do as I will find great difficulty in keeping the temperature exactly right every time, so I think for sheer easiness I will chose light distance as my variable.

PREDICTION

I predict light affects the rate of photosynthesis because photosynthesis is light splitting water molecules from hydrogen and oxygen and photosynthesis cannot take place without it, this is why all photosynthesis happens during the day time and never at night, people are often confused that the dark reaction in photosynthesis happens at night but it does not, the dark reaction takes place when the carbon dioxide needs to produce glucose.

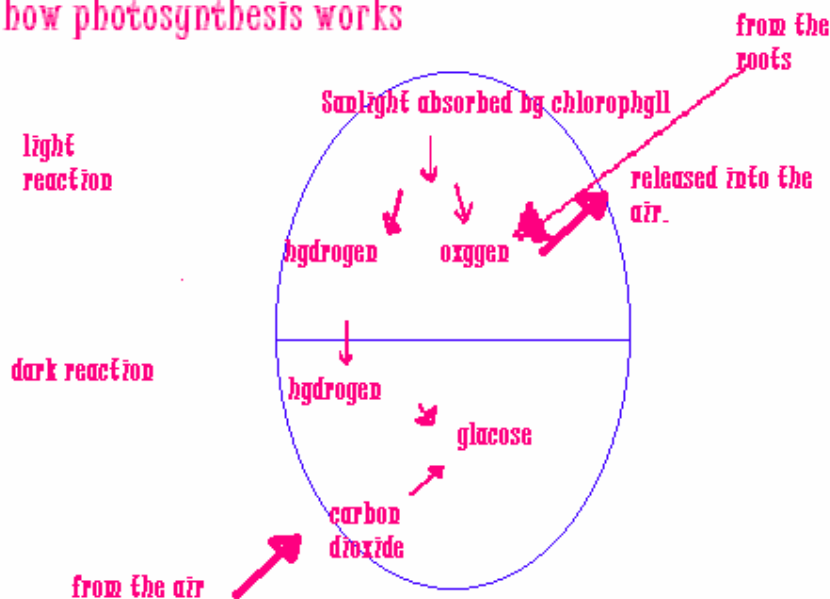
Light is used to split H_2O into 2; I should be able to see this, as it is the bubbles coming out of the plant.

I ought to be able to study the rate of photosynthesis from the amount of bubbles coming from the plant at certain times.

The condition of light will affect the photosynthesis as if the light is closer to the experiment there will be more bubbles because the vast amount of light energy will split water up into oxygen and hydrogen, and so the more oxygen there is from the closer light, the more bubbles there will be.

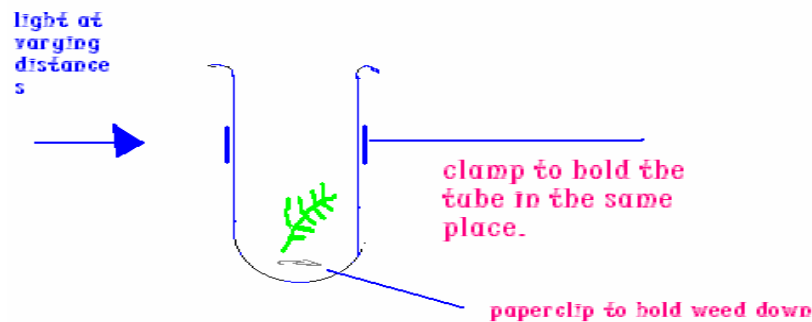
And if the light is further away the rate of photosynthesis will be slower seeing as there will be less light energy used to split up the water.

how photosynthesis works



EQUIPMENT LIST

Test Tube
Clamp
Canadian Pond Weed
Paperclip
Lamp/Torch



SAFETY

I will have to take care that I do not touch the hot bulb or splash any water on it and I will have to follow the labs safety rules.

WHAT I WILL DO

I will be counting bubbles because they are bubbles of oxygen; I am carrying out this experiment to find the speed of photosynthesis.

In a blacked out room I will hold a light at 5 different distances (10 cm, 20 cm, 30 cm, 40 cm and 50 cm) away from the weed in water for a minute each. And will repeat this 3 times each so that I will have 3 sets of results to work from, to help me recognise anomalous results and to get an accurate average.

In order to keep this a fair test I will use the same piece of pond weed and water each time so that I don't have too worry about getting results that are completely different from each other because there is something different about new pieces of weed and beakers of water to the last.

I will take results after 3 minutes for each individual experiment.

The only thing I will change is going to be the distance of the lamp from the pondweed.

RESULTS**Experiment 1**

Distance of plant from light	Number of bubbles after 1 minute	Temperature
5	27	24
10	60	22
15	3	23
20	1	25
25	0	24

Experiment 2

Distance of plant from light	Number of bubbles after 1 minute	Temperature
5	19	24
10	56	22
15	2	23
20	0	25
25	10	24

Experiment 3

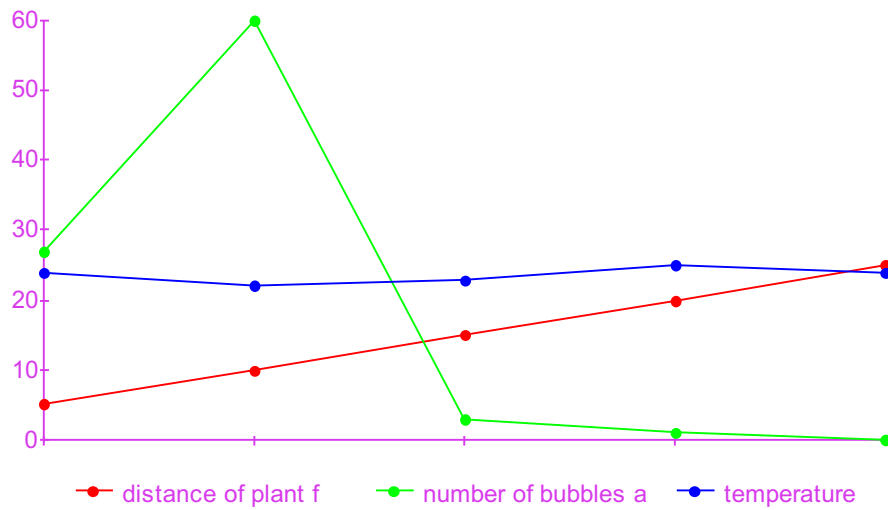
Distance of plant from light	Number of bubbles after 1 minute	Temperature
5	40	24
10	3	23
15	0	24
20	1	24

25	0	22
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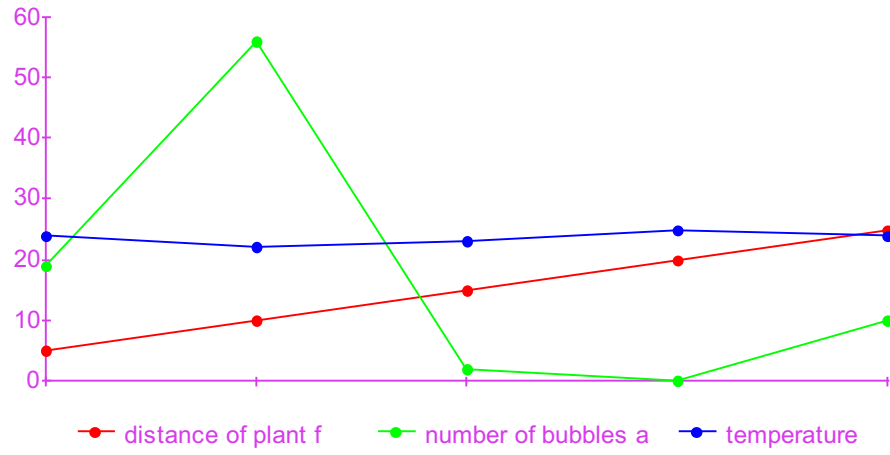
Averages

Distance of plant from light	Number of bubbles after 1 minute	Temperature
5	28.6	23.3
10	39.6	22.6
15	1.6	23.3
20	0.3	24.3
25	5.3	22.6

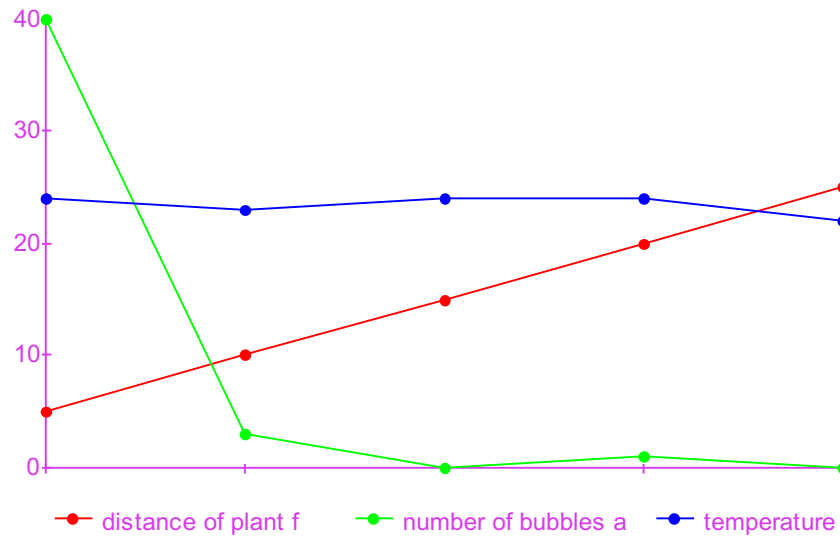
Experiment 1



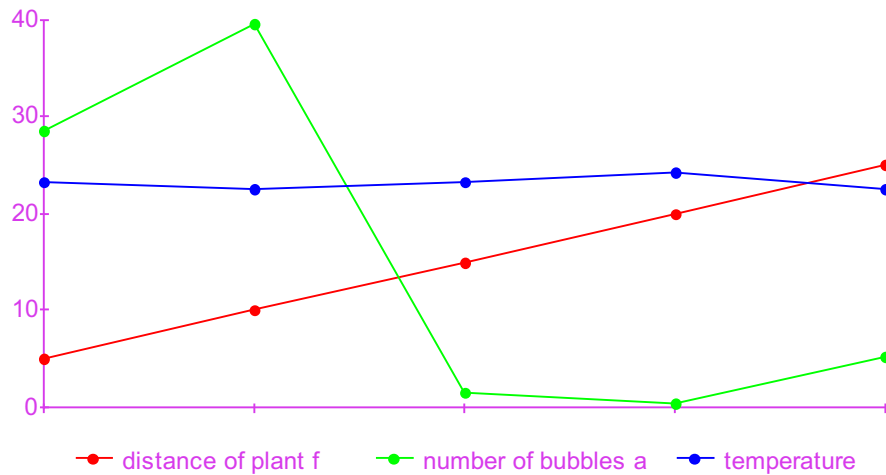
Experiment 2



Experiment 3



Averages



ANALYSIS

The pattern in my results showed that my prediction was wrong, I however still believe that my original prediction was correct as I used my knowledge of photosynthesis to help me, my results are obviously anomalous because really they should be showing the amount of photosynthesis getting less and less as the light is further and further away. But instead they show the amount of bubbles getting higher and lower followed by higher again! This is rather confusing, as I am sure that the number of bubbles produced ought to be much greater when the distance of the pondweed from the lamp is less

EVALUATION

I think that on the whole my experiment went quite wrong, the results I gathered were VERY strange I believe this to be because of the poor quality of the pondweed that I used.

With the set of results that I had, I was able to calculate an average, however

this still did not follow my prediction!

I believe that my measurements were about as accurate as I could get using the apparatus that we had.

I experienced many problems during the experiment, I found that due to the poor quality of my pondweed. It was photosynthesising very slowly at some points, and photosynthesising too quickly to count at others, another problem was when the desk lamp was closer to the pond weed it actually caused the pondweed to be hotter than in the other further away experiments, and so this made for a slightly unfair test!

If I could do this experiment all over again I would have taken the opportunity to use other people's results as mine were so strange.

By Shahnaz Zarif 10s