

Photosynthesis to find effects of distance of a light source from pond weed has on the amount of oxygen produced

## Photosynthesis

All green plants need to be able to make their own food. They do this by a process called photosynthesis. For photosynthesis to occur they need sunlight energy. This energy is absorbed by a green pigment called chlorophyll, which is mainly 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 is produced. This is called glucose. Also oxygen is made.

For my experiment I have chosen to use light distance as my variable. This means that to carry out a fair test everything else must be kept the same during the experiment.

## Hypothesis

I think that as the light source (desk lamp) is moved closer to the pondweed, the rate that oxygen is produced will increase therefore more oxygen will be produced and also more glucose. I believe this will happen because when the light source is nearer to the plant more of the plant's surface area is coming in to contact with the light from the desk lamp therefore more photosynthesis will occur which will mean more oxygen and glucose will be produced.

## Apparatus

- Funnel.
- Measuring cylinder.
- Stop watch.
- Card board and foil (used to filter the light).
- Beaker.
- Desk lamp.
- one metre ruler stick.
- Balance.
- Pondweed.
- Carbon dioxide Powder.
- Water.
- Scapular.

## 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.
- Chose a value for carbon dioxide mixture and keep at the same value all the way through the experiment(3 grams).
- Keep the experiment at a constant 20degrees (this is because more oxygen is produced at this temperature).
- Take results after three minutes for each individual experiment.

### Safety

- Follow lab safety rules (eg no running bags at back etc).
- keep the desk lamp away from contact with water.
- Be careful when using scapuar.

### Method

- Collect apparatus.
- Set up apparatus as in diagram.
- Fill measuring cylinder and beaker with water.
- Add carbon dioxide mixture to water.
- Set up desk lamp in correct position(eg 10cm).
- Turn on desk lamp and start stopwatch.
- Count the bubbles for the next three minutes and also make a note of the change in volume.
- Record your results.
- Repeat experiment twice more for distance 10cm and then do the same with distance 20,30,40,50,60,70,80,90, and 100cm.

### Results

These are my results

Because my results did not go entirely to plan(because my pondweed was not photosynthesising quick enough) I have been given a past years results which I will now use as my results instead.They are as follows-

### Analysis

Looking at my results a can see a significant increase in the rate of photosynthesis as the distance decreases.All of the results I was given show this pattern.In the experiment when the distance was 50cm there was not much photosynthesis taken place only about 13 bubbles of oxygen were produced,but

when the desk lamp was 0cm away a lot of photosynthesis was occurring on average 184 bubbles in three minutes a quite substantial difference from 50cm, overall it was a quite significant increase. I believe this is because when the desk lamp is close to the pondweed more of the pondweed's surface area has light energy shining upon it which means more photosynthesis will occur in a shorter time. The average no. of bubbles for different distances are as follows-

Looking at my results it is quite evident that the number of bubbles produced is much greater when the distance of the pondweed from the desk lamp is less. This proves that my original hypothesis was correct that "as the distance decreases of the desk lamp from the pondweed therefore more oxygen bubbles are produced". As I mentioned before this is because there is more light energy shining on a greater surface area when the desk lamp is closer so therefore greater surface area equals more photosynthesis.

#### Evaluation

I think that on the whole my experiment was ok. The results I gathered were very odd I believe this is because of the poor quality of the pondweed we used. But with the set of results we were given we were able to calculate accurate averages which followed my prediction.

I believe our measurements were about as accurate as we could get using the apparatus that we did.

We experienced quite a few problems throughout our experiment. These were first of all in our first experiment our pondweed was not of a high standard and was photosynthesizing very slowly the only way we could have got around this problem without using new pondweed would be to leave the experiment for longer. Another problem we encountered was the change in temperature when the desk lamp was close to the pondweed because we could not do anything to amend this we had to accept any slight change in our results. Another problem we faced was counting the bubbles when the plant was photosynthesizing the bubbles were different sizes, but as talked about in my preliminary data we overcame this problem by counting every individual bubble as one.