Photochemical reactions

Photochemical reaction is a reaction that takes place in presence of light.

Ex: Photosynthesis, the reactions that occur in film photography.

Photosynthesis:

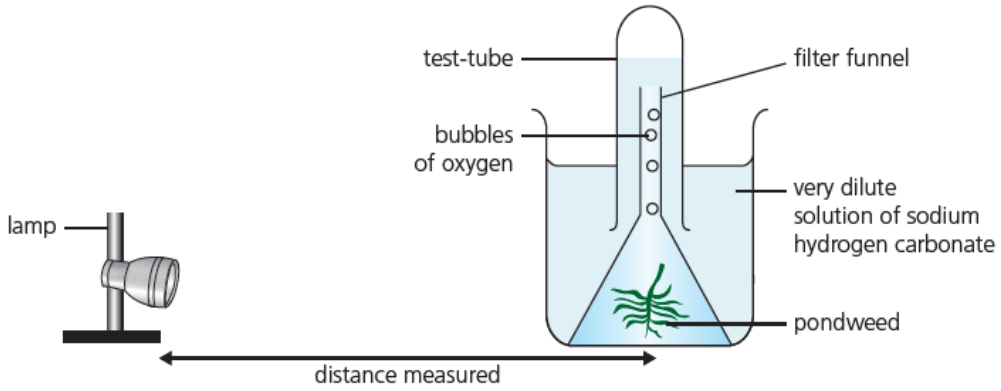
Photosynthesis is the reaction between carbon dioxide and water, in the presence of chlorophyll and sunlight, to produce glucose.

$$\underset{\text{carbon dioxide}}{6CO_2\,(g)} + \underset{\text{water}}{6H_2O\,(l)} \xrightarrow[\text{chlorophyll}]{\text{light}} \underset{\text{glucose}}{C_6H_{12}O_6\,(aq)} + \underset{\text{oxygen}}{6O_2\,(g)}$$

Changing the rate of the photosynthesis reaction:

Experiment:

Pondweed is a suitable plant to use for the experiment.



1. Put some pondweed in a beaker containing a very dilute solution of sodium hydrogen carbonate, $NaHCO_3$. (This compound decomposes, giving off carbon dioxide.) Place a funnel over it.
2. Place a test-tube full of the solution over the funnel, as shown.
3. Place the lamp 50 cm from the beaker. (Look at the arrow above.)
4. Let the pondweed adjust to the conditions for 1 minute. Then count the bubbles of oxygen it gives off, over 1 minute. Repeat twice more to get an average value per minute. Record your results.
5. Repeat step 4, with the lamp placed at 40, 30, 20, and 10 cm from the beaker.

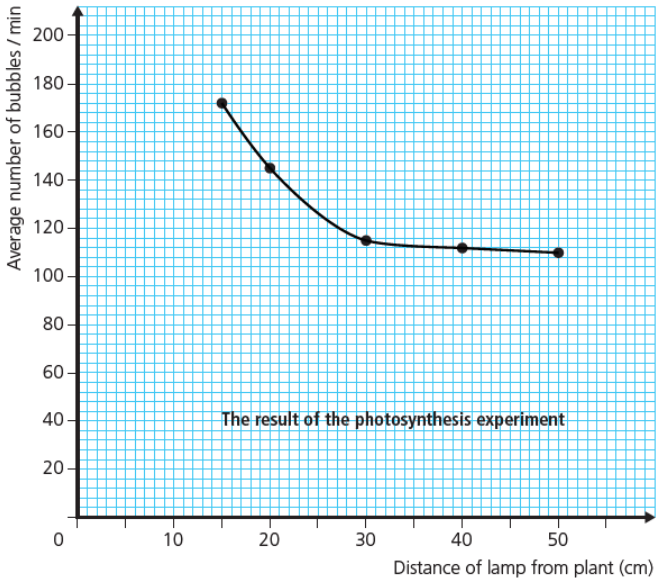
The results This graph shows that the number of bubbles per minute *increases* as the lamp is brought closer to the plant.

The closer it is, the greater the strength or **intensity** of the light that reaches the plant. So we can say that the rate of photosynthesis increases as the intensity of the light increases.

That makes sense. Light provides the energy for the reaction. The stronger it is, the more energy it provides. So more molecules of carbon dioxide and water gain enough energy to react.

A photochemical reaction can be speeded up by increasing the intensity of the light.

This is true of all photochemical reactions.



Reactions in film photography:

Another example for the photochemical reaction is the reaction that occurs in film photography.

In film photography, the film is covered with a coating of gel that contains tiny grains of silver bromide.

When we click camera to take the photo, the camera shutter opens briefly and light enters and strikes the film. The silver bromide is sensitive to light, and when light strikes, it decomposes to tiny dark particles of silver, which appears black.

The brighter the light falling on photography film, the faster the reaction.

The chemical equation of silver bromide decomposing to silver and bromine is shown below:

$$2AgBr\ (s) \longrightarrow 2Ag\ (s) + Br_2\ (l)$$

Silver bromide decomposes in presence of light to silver and bromine.

It is both a photochemical reaction and redox reaction.