

In this experiment we are going to investigate one of the limiting factors of photosynthesis - wavelength of light.

For this experiment we need:

Universal bottles.

Blue, red and green coloured filters.

Hydrogencarbonate indicator, also known as bicarbonate indicator.

A beaker containing a water plant like Elodea.

Scissors and a desk lamp.

Hydrogencarbonate indicator is sensitive to carbon dioxide levels.

It is red in equilibrium with the air.

We can show this by blowing through a straw into the indicator.

This increases the carbon dioxide level changing the indicator colour from red through orange to yellow.

When carbon dioxide is removed from the indicator by a plant photosynthesizing, the indicator will change from red through magenta to deep purple.

To start the experiment, place a piece of the water plant Elodea into a universal bottle.

Then fill the bottle with hydrogencarbonate indicator, covering the piece of plant.

Seal the bottle with a cap.

Then repeat this process three more times.

One bottle is left uncovered.

One is covered in a red filter.

One in a blue filter and one in a green filter.

Place the bottles equidistant from the desk lamp.

If you don't have a lamp you could leave them in natural light on a windowsill.

Once the experiment is set up it is left for a minimum of an hour before the results are taken.

After an hour we can compare the colour of the indicator with the colour chart and describe the results and what they mean.

We can draw up a table with columns with headings of condition, colour of indicator, and is the plant photosynthesizing?

Let's check the results of the experiment.

The indicator in the uncovered bottle shows a colour change from red to deep purple.

This means that the rate of photosynthesis is greater than the rate of respiration.

This has decreased the levels of carbon dioxide.

The bottles covered in the red and blue filters show a colour change to a dark red or magenta.

These light wavelengths have allowed photosynthesis to occur.

The rate is lower than the rate of the uncovered bottle, but still higher than the rate of respiration.

Carbon dioxide levels have decreased.

The bottle with the green filter shows a colour change to orange.

Photosynthesis has not taken place.

This is due to the green plant reflecting the green light.

This experiment shows that wavelength of light is a limiting factor for photosynthesis.

Plants can photosynthesise best in white light.

Which is the full spectrum of colours.

Red and blue light wavelengths can also be used for photosynthesis.