

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

Light intensity.

We will need the following equipment:

Universal bottles.

Hydrogencarbonate indicator, also known as bicarbonate indicator.

A beaker containing a water plant like Elodea.

A grey light filter.

Black paper.

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 twice more.

One bottle is left uncovered.

One is covered in a grey filter and one is covered in black paper.

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.

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.

It's time to check our results.

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

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

This has decreased the levels of carbon dioxide.

In the bottle with the grey filter, the indicator is red.

A small amount of photosynthesis has occurred in this bottle.

The carbon dioxide levels are higher than in the bottle with no filter.

The bottle covered in black paper shows a colour change from red to yellow.

No light has entered so the rate of respiration is higher than the rate of photosynthesis and carbon dioxide levels have increased.

The experiment shows that light intensity is a limiting factor for photosynthesis.