

GCSE Biology – Photosynthesis - Transcript

All life needs energy. Animals get theirs from the food they eat. Plants however, make their own food. They turn light energy from the sun into sugars through a series of chemical reactions called photosynthesis.

For photosynthesis to occur, a plant needs carbon dioxide, which enters the leaf through the stomata, and water, which is transported through the plant from the roots.

It also needs chlorophyll. This green pigment in the leaf absorbs light energy which drives and powers the reaction. The light energy is used to convert the carbon dioxide and water into glucose. Oxygen is released as a byproduct.

Photosynthesis can be summarised by the equation: Carbon dioxide plus water goes to glucose and oxygen when light and chlorophyll are present. And because photosynthesis takes in energy it's an endothermic reaction.

The five key factors that affect the rate of photosynthesis are light, carbon dioxide, water, temperature and the amounts of chlorophyll. Let's take a plant and keep each factor constant except the light intensity, which we'll increase.

As it increases, the rate of photosynthesis also increases, up to a point. You can see that it starts to level off. This tells us that light intensity is no longer a limiting factor - something that slows down a process because there isn't enough of it.

Something else, like carbon dioxide, is in low supply. If we reset the experiment, and this time only increase CO₂, the rate of photosynthesis increases again, until another factor, like temperature, becomes the limiting factor.

Temperature affects the rate of photosynthesis because the enzymes involved in the process work faster as the temperature rises. If it gets too hot, usually above 40c, the enzymes denature and stop working.

The chemical reactions can no longer occur and the rate of photosynthesis drops rapidly. The amount of chlorophyll in the leaf also affects the rate of photosynthesis. This variegated leaf has both green areas with chlorophyll and white areas without it.

Only the green parts of the plant can carry out photosynthesis as chlorophyll is required. No light energy is absorbed in the white areas.

The more chlorophyll present, the greater the rate of photosynthesis. So maximising a plant's access to these factors, like light and carbon dioxide, and keeping them in a warm environment increases the rate they can convert water and CO₂ into glucose.

That's why plants in greenhouses can grow so lush. They are the perfect conditions for photosynthesis!