

Chlorophyll

Inside the plant cell are small organelles called chloroplasts, which store the energy of sunlight. Within the thylakoid membranes of the chloroplast is a light-absorbing pigment called chlorophyll, which is responsible for giving the plant its green color. During photosynthesis, chlorophyll absorbs energy from blue- and red-light waves, and reflects green-light waves, making the plant appear green.

Light-dependent reactions vs. light-independent reactions

While there are many steps behind the process of photosynthesis, it can be broken down into two major stages: light-dependent reactions and light-independent reactions. The light-dependent reaction takes place within the thylakoid membrane and requires a steady stream of sunlight, hence the name light-*dependent* reaction. The chlorophyll absorbs energy from the light waves, which is converted into chemical energy in the form of the molecules ATP and NADPH. The light-independent stage, also known as the Calvin Cycle, takes place in the stroma, the space between the thylakoid membranes and the chloroplast membranes, and does not require light, hence the name light-*independent* reaction. During this stage, energy from the ATP and NADPH molecules is used to assemble carbohydrate molecules, like glucose, from carbon dioxide.

C3 and C4 photosynthesis

Not all forms of photosynthesis are created equal, however. There are different types of photosynthesis, including C3 photosynthesis and C4 photosynthesis. C3 photosynthesis is used by the majority of plants. It involves producing a three-carbon compound called 3-phosphoglyceric acid during the Calvin Cycle, which goes on to become glucose. C4 photosynthesis, on the other hand, produces a four-carbon intermediate compound, which splits into carbon dioxide and a three-carbon compound during the Calvin Cycle. A benefit of C4 photosynthesis is that by producing higher levels of carbon, it allows plants to thrive in environments without much light or water.

