

PHOTOSYNTHESIS IN PLANT

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ANNOTATION

This article describes the process of photosynthesis in plants and its importance in human life.

Key words: photosynthesis, solar energy, oxygen, plants, CO₂, chloroplasts, chlorophyll, light, organic compounds.

Photosynthesis is a highly regulated, multistep process. It encompasses the harvest of solar energy, transfer of excitation energy, energy conversation, electron transfer from water to NADP⁺, ATP generation and a series of enzymatic reactions that assimilate carbon dioxide and synthesize carbohydrate.

As a result of the photosynthesis process, organic matter is formed in chloroplasts with the presence of water and carbon dioxide under the influence of solar light. Photosynthesis of plants is the only means of converting solar energy into chemical energy of organic compounds on earth. That is the cosmic significance of photosynthesis. Organic compounds formed in this process serve as a source of food and energy for living organisms. At the same time, the process of photosynthesis enriches the atmosphere with free oxygen. Green plants are phototrophic organisms. They use the chlorophyll pigment stored in the chloroplasts in the cell to carry out photosynthesis, which converts light energy into chemical energy.

Photosynthesis can be summarized by the formula:



Photosynthesis consists of two processes. A light beam-photon falls on the chlorophyll molecule and brings it to an excited state, its electrons move to a higher orbit. Accordingly, the separation of electrons from the molecule becomes easier. One of the excited electrons passes to the carrier molecule, which takes it and transports it to the other side of the membrane. Chlorophyll molecule takes an electron from water and replaces the lost electron.

As a result of the loss of electrons, water molecules disintegrate into protons and oxygen atoms. Dissociation of water under the influence of light is called photolysis. The hydrogen atom formed as a result of photolysis forms a weak bond with organic compounds. Hydroxyl ions, that is, OH, gives its electron to other molecules and becomes a free radical. OH radicals react with each other to form water and molecular oxygen.



The source of oxygen released during photosynthesis is water. In addition to photolysis, light energy is also used for the synthesis of ATP from ADP and phosphate without the participation of oxygen. This was the first stage of photosynthesis. In the light stage of photosynthesis, three important processes occur: molecular oxygen and atomic hydrogen as a result of water photolysis formation and synthesis of ATP.

The dark stage of photosynthesis. The following reactions of photosynthesis are associated with the formation of carbohydrates:



For the dark reactions of photosynthesis, raw materials and energy are continuously supplied to the chloroplast. Carbon 4 oxide enters leaf cells from atmospheric air, and hydrogen atom is formed as a result of photolysis of water. ATP, synthesized during the light phase of photosynthesis, serves as an energy source for the synthesis of carbohydrates. Under the influence of these substance, the synthesis of carbohydrates takes place in the chloroplasts.

Water is the source of molecular oxygen produced as a result of photosynthesis and released into the atmosphere. Plants use the process of photosynthesis to transform water, sunlight, and carbon dioxide into oxygen, and simple sugars that the plant uses as fuel. These primary producers form the base of an ecosystem and fuel the next trophic levels. Without this process, life on Earth as we know it would not be possible.

References:

1. <https://en.wikipedia.org/wiki/Photosynthesis>
2. <https://www.britannica.com/science/photosynthesis>