

Photosynthesis



Chloroplast:
A structure that contains chlorophyll and is the site where photosynthesis and starch formation occur.

Chlorophyll:
A green substance which gives leaves their color. Chlorophyll absorbs energy from sunlight which a plant uses to make food.

Of all the organisms in the natural world, green plants are the only ones that manufacture their own food. This process is called **photosynthesis** and begins when light strikes the plant's leaves (both sunlight and artificial light can power this process). Photosynthesis occurs in structures in the plant's leaves called **chloroplasts**. Chloroplasts contain a green chemical called **chlorophyll** which interacts with sunlight to split the water in the plant into its basic components. Carbon dioxide enters the leaf through holes called **stomata** and combines with the stored energy in the chloroplasts through a chemical reaction to produce a simple sugar. The sugar is then transported through tubes in the leaf to the roots, stems and fruits of the plants. Some of the sugar is used immediately by the plant for energy; some is stored as starch; and some is built into a more complex substance, like plant tissue or cellulose. The sugar molecules can combine with other elements to produce proteins, fats, and more complex carbohydrates. Fortunately for us, plants often produce more food than they need, which they store in stems, roots, seeds or fruit.

We can obtain this energy directly by eating the plant itself or its products, like carrots, rice or potatoes. Photosynthesis is the first step in the food chain which connects all living things. Every creature on earth depends to some degree on green plants. The oxygen that is released by the process of photosynthesis is essential for all living things. Forests have been called the "lungs of the earth" because animals inhale oxygen and exhale carbon dioxide in the process of breathing, and plants take in carbon dioxide and give off oxygen in the process of photosynthesis.

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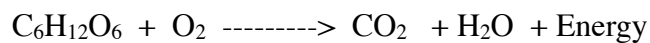
Stomata:
A very small hole in the surface of a leaf. Oxygen and carbon dioxide from the air enter through the stomata; oxygen, carbon dioxide and water vapor leave through the stomata.

Photosynthesis:
The formation of sugar in the chlorophyll-containing tissues of plants exposed to light.

Transportation:
Plants have specialized cells to carry materials. Tube like cells called xylem carry water and minerals up through the plant. Phloem cells carry sugar down from the leaves.

Cellular Respiration

All the activities that happen in an organism need energy to drive them. This energy is released through the process of cellular respiration, a process in which oxygen is chemically react with sugar in the mitochondria of the cell. Both plants and animals get energy through cellular respiration. Because it is a chemical process, it can be shown in a chemical equation.



Notice that in addition to releasing energy, cellular respiration also produces carbon dioxide and water.



Cellular respiration occurs in both animals and plants meaning **PLANTS NEED OXYGEN TOO!**

Mitochondria - Turning on the Powerhouse

Mitochondria are known as the powerhouses of the cell. They act like a digestive system that takes in nutrients, breaks them down, and creates energy for the cell. The process of creating cell energy is known as **cellular respiration**. Most of the chemical reactions involved in cellular respiration happen in the mitochondria.

Questions

- _____ 1. The materials required for photosynthesis to occur are
- Oxygen, water, and sunlight
 - carbon dioxide, water, and minerals
 - carbon dioxide, water, and sunlight
 - water, minerals, and sunlight
- _____ 2. During photosynthesis, which energy transformation takes place
- light energy to heat energy
 - heat energy to chemical energy
 - chemical energy to light energy
 - light energy to chemical energy
- _____ 3. Plants and animals use oxygen to
- make sugar molecules and store energy
 - break apart sugar molecules to release energy
 - produce fats and proteins
 - change sugar molecules to starch and store energy
- _____ 4. What process do all cells have in common?
- cellular respiration
 - digestion
 - photosynthesis
5. Look at the equation for photosynthesis

What are the reactants for this equation?

What are the products for this equation?

6. Look at the equation for cellular respiration

What are the reactants for this equation?

What are the products for this equation?

Use ideas from the reading to complete the following sentences.

Photosynthesis is the process that combines 7. _____ from the air with water to produce 8. _____.

9. _____ from the sun is absorbed by a structure in the plant cell called a 10. _____ which contains a green pigment called 11. _____.

Sugar molecules produced in the leaves may be used right away by the plant or stored in structures like 12. _____ or 13. _____. Some of the sugar is combined with other elements to form 14. _____, 15. _____ and 16. _____.

Photosynthesis is important because it makes the food and 17. _____ that all living things need.

The energy stored in a sugar molecule can be released through the process of cellular respiration. This chemical reaction occurs in the 18. _____ of a cell and uses 19. _____ from the air. The process of cellular respiration is needed by both 20. _____ and animals.