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# ENERGY FLOW THROUGH LIVING SYSTEMS

## PHOTOSYNTHESIS: NUTRITION IN PLANTS

There are two main types of nutrition:

1. Autotrophic nutrition (self-feeding e.g. plants and some bacteria)
2. Heterotrophic nutrition (other-feeding e.g. animals).

This lesson, we are focusing on autotrophic nutrition. Remember that plant cells have a special organelle that animal cells do not have. It is called the chloroplast. The chloroplast is the site of a process called PHOTOSYNTHESIS that occurs only in plants. The plant therefore does not rely on other living organisms to make its food. They feed themselves via photosynthesis. Photosynthesis is therefore the process whereby green plants make organic substances from inorganic substances in the presence of sunlight energy.

Photosynthesis takes place in the green parts of plants namely the leaves and stem. These contain the green pigment chlorophyll. In some plants other pigments hide the green color, and the leaf may appear red, brown or orange. Chlorophyll absorbs light energy which is used to power the process of photosynthesis.

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## Student's Work

**Answer the following questions based on the information on page 16.**

1. What are the TWO main types of nutrition mentioned in the passage?

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2. Which organelle in plant cells is responsible for photosynthesis?

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3. Define photosynthesis in your own words.

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4. In which parts of a plant does photosynthesis mainly take place?

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5. What role does chlorophyll play in photosynthesis?

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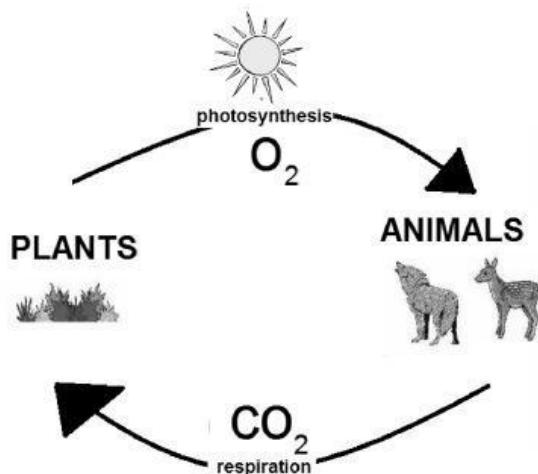
## Definition of Photosynthesis

*Photosynthesis is the process where green plants combine water and carbon dioxide by using sunlight energy in order to produce glucose and the by-product oxygen.*

So, photosynthesis is how green plants use sunlight to make glucose which is their food source.

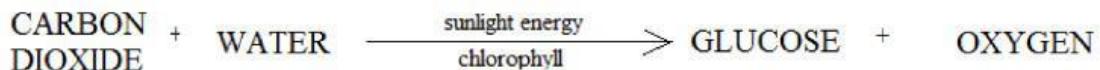
## Importance of Photosynthesis

1. Directly responsible for the life and survival of all the other living creatures on earth.
2. It supplies oxygen without which breathing and respiration would be impossible.
3. It is the way that sunlight energy is used by plants to make different nutrients that can animals can obtain by eating the plants.
4. It supplies energy to plants which they pass on to animals when eaten.



## Equations for Photosynthesis

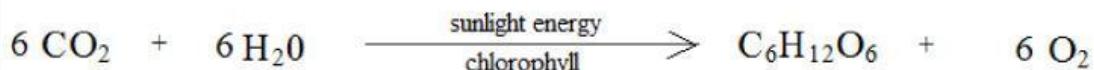
The word equation for photosynthesis is:



The chemical equation for photosynthesis is:

*Prepared by: Simone Haughton 2010, 2011, 2012, 2013, 2019, 2025*

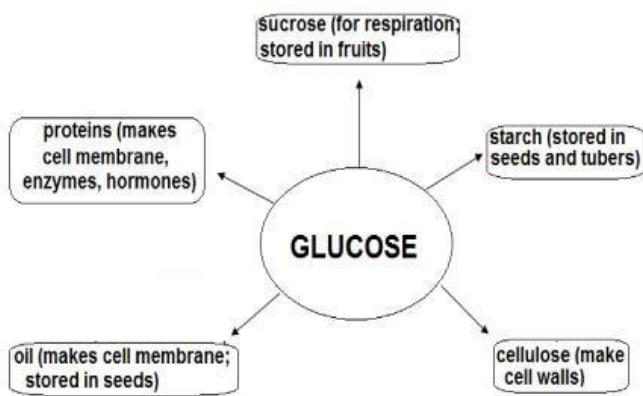
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The carbon dioxide and water are called the raw materials of photosynthesis. The GLUCOSE is the main product and the oxygen is a by-product of the process.

### What Happens to the Products of Photosynthesis?

The oxygen produced by photosynthesis will diffuse into the atmosphere for animals to breathe. But the Glucose, which is the main product, is a very important starting material for all the other nutrients a plant needs. The excess glucose that is made during photosynthesis is stored as the **starch grains** in the chloroplasts.



### Conditions Necessary for Photosynthesis

1. Carbon dioxide (diffuses into leaf through stomata)
2. Water (absorbed from soil by roots)
3. Sunlight energy (absorbed by chlorophyll)
4. Chlorophyll (green pigment in chloroplasts)
5. Enzymes (present in chloroplasts)
6. Mineral elements (absorbed from soil by roots)
7. Correct temperature (0°C to 40°C for enzymes)

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## Student's Work

Answer the following questions based on information on pages 18-19.

**Multiple Choice Questions. Circle the letter of the correct answer.**

- 1. Which of the following is the main product of photosynthesis?**
  - a) Oxygen
  - b) Glucose
  - c) Starch
  - d) Water
  
- 2. What happens to the oxygen produced during photosynthesis?**
  - a) It is stored as starch
  - b) It is broken down into carbon dioxide
  - c) It diffuses into the atmosphere
  - d) It turns into glucose
  
- 3. Which of the following is NOT a condition necessary for photosynthesis?**
  - a) Sunlight energy
  - b) Chlorophyll
  - c) Carbon dioxide
  - d) Nitrogen gas
  
- 4. What is the by-product of photosynthesis?**
  - a) Glucose
  - b) Carbon dioxide
  - c) Oxygen
  - d) Water

**True or False.** Write TRUE if the statement is true and FALSE if it is false.

5. Photosynthesis produces glucose as the main product. \_\_\_\_\_
  
6. Enzymes play no role in photosynthesis. \_\_\_\_\_
  
7. The excess glucose made in photosynthesis is stored as starch grains.  
\_\_\_\_\_
  
8. Photosynthesis is only important for plants, not animals. \_\_\_\_\_
  
9. The raw materials of photosynthesis are carbon dioxide and water. \_\_\_\_\_

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**Fill in the Blanks below using the key words.**

<b>carbon dioxide</b>	<b>chlorophyll</b>	<b>diffuse</b>	<b>glucose</b>
<b>soil</b>	<b>starch</b>	<b>stomata</b>	<b>temperature</b>

10. Photosynthesis is the process where green plants combine water and \_\_\_\_\_ by using sunlight energy to produce glucose.

11. The \_\_\_\_\_ is considered the main product of photosynthesis.

12. Oxygen produced during photosynthesis will \_\_\_\_\_ into the atmosphere.

13. The excess glucose in plants is stored as \_\_\_\_\_ grains in the chloroplasts.

14. Sunlight energy is absorbed by the green pigment called \_\_\_\_\_.

15. Carbon dioxide diffuses into the leaf through the \_\_\_\_\_ for photosynthesis.

16. Correct \_\_\_\_\_ for enzymes in photosynthesis ranges from 0°C to 40°C.

17. Mineral elements needed for photosynthesis are absorbed from the \_\_\_\_\_ by the roots.

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### Short Answer Questions

18. Define photosynthesis in your own words.

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19. Give two reasons why photosynthesis is important for living creatures.

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20. Write the word equation for photosynthesis.

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20. Write the chemical equation for photosynthesis.

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21. Where does the energy that drives photosynthesis come from?.

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22. What are the raw materials for photosynthesis?

and \_\_\_\_\_

23. What are the products for photosynthesis?

\_\_\_\_\_ and \_\_\_\_\_