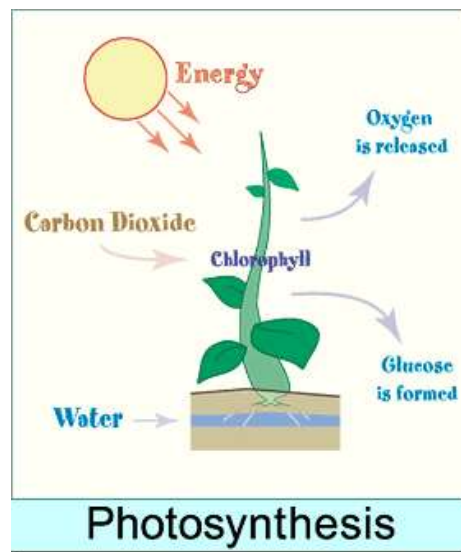


# Carbon Dioxide and Photosynthesis

**Overview** Photosynthesis is a process where light energy is changed into chemical energy. This process happens in the chloroplast of plant cells. Photosynthesis is one of the most important things that happen in cells. In fact, photosynthesis is considered one of the most important processes for all life on Earth. It makes sense that photosynthesis is really important to plants, since it gives them energy, but why is it so important to animals? In this lab, you will see evidence of plants giving off the oxygen animals need to survive.

**What to Learn** There are many steps to photosynthesis, but if we wanted to sum it up in one equation, it would be carbon dioxide (CO<sub>2</sub>) + water (H<sub>2</sub>O) makes glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) and oxygen (O<sub>2</sub>). These words can be written like this:  $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Light Energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$



Carbon dioxide, water, and energy combine to form glucose and oxygen. Glucose is a kind of sugar. This sugar is important for energy, so the plant stores all the glucose it creates. However, the plant releases the oxygen it creates. Now we can see two reasons why photosynthesis is so important not just to plants, but to animals too. First, all animals need oxygen to live. Photosynthesis produces oxygen, so without this process, animals could not survive. Also, don't forget that since animals can't make their own food, they have to eat plants, or eat other animals that have eaten plants. So without plants, animals would quickly run out of food.

## Materials

- candle
- lighter with adult help
- large glass jar
- stopwatch
- leafy plant (weeds work also)
- Optional: sodium hydroxide and iodine

## Experiment

1. Light your candle.
2. Invert the glass over it and time how long it takes the candle to use up all the oxygen and extinguish itself. Write this number down in your journal.
3. Find a young plant or bush, preferably with a lot of growth and leaves. Place your candle next to the plant (don't burn your plant!) and invert the jar over it again.
4. Use your stopwatch to time how long the candle stays lit. Write this number down in your journal.
5. Which one do you expect to take longer? What actually happened?
6. Create a Data Table.

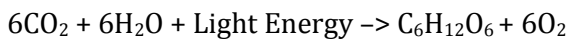
## Carbon Dioxide and Photosynthesis Data Table

Object Under the Glass	Time For Candle to Extinguish

## Reading

Plants use carbon dioxide (CO<sub>2</sub>) and energy from sunlight to build molecules of sugar and release oxygen. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis, and then from organism to organism in food webs. Mitochondria liberate energy for the work that cells do, and chloroplasts capture sunlight energy for photosynthesis. Students will observe evidence of plants giving off oxygen in the process of photosynthesis.

There are many steps to photosynthesis, but if we wanted to sum it up in one equation, it would be carbon dioxide (CO<sub>2</sub>) + water (H<sub>2</sub>O) makes glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) and oxygen (O<sub>2</sub>). These words can be written like this:



Carbon dioxide, water, and energy combine to form glucose and oxygen. Glucose is a kind of sugar. This sugar is important for energy, so the plant stores all the glucose it creates. However, the plant releases the oxygen it creates.

## Exercises

1. Describe the process of photosynthesis in words.
2. Write the chemical equation for photosynthesis.
3. What is glucose?
4. Why is glucose important for plants?

5. Why are plants necessary for animals?

6. Does the result of the experiment depend on how large the plant is? Why or why not?

### **Answers to Exercises: Carbon Dioxide and Photosynthesis**

1. Describe the process of photosynthesis in words. (Carbon dioxide, water, and light energy combine to form glucose and oxygen.)
2. Write the chemical equation for photosynthesis. ( $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Light Energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ )
3. What is glucose? (Glucose is a kind of sugar)
4. Why is glucose important for plants? (It gives energy to plants)
5. Why are plants necessary for animals? (Plants give off the oxygen produced in photosynthesis. Animals breathe in this oxygen. As well, animals eat plants or other animals that eat plants, so plants are also necessary for animal food).
6. Does the result of the experiment depend on how large the plant is? Why or why not? (Yes, if the plant is not large enough, it won't give off enough oxygen to keep the candle lit longer than if there were no plant inside of the glass)