

# Photosynthesis



**Real World Energy  
Activity**  
Grade Level: 9-12

## Main Objectives

Learners are introduced to the process of photosynthesis through the readings of the backgrounder and answering questions that follow it.

## Learning Outcomes

By the end of this activity, learners will:

- Describe the conditions and ingredients required for photosynthesis to occur
- Describe the by-products of photosynthesis
- Describe the role of chlorophyll in trapping radiant energy and converting it to chemical energy

## Length of Activity

3 hours

## Materials List

Photosynthesis Backgrounder  
Photosynthesis Learner Activity Instructions  
Photosynthesis Learner Worksheet

## Background

Photosynthesis is an extremely important process in nature. Without photosynthesis, there would likely be no life on Earth. Through photosynthesis, plants are able to make their own food from nothing more than water and carbon dioxide, with the help of energy from the sun. The food source that plants produce is in the form of glucose. Glucose is the basic food of all life forms on the planet. It is the main fuel for all of the activities of cells. Green plants are the only

organisms that make their own glucose. Green plants also require glucose to survive. How does the plant survive at night when there is no sunshine to help make glucose? How do the roots survive if they are never exposed to sunlight?

## Procedure

1. Distribute the backgrounder and learner activity and have the learners read the backgrounder and answer the questions on the worksheet.
2. Review the information with the learners. Emphasize the fact that plant cells exposed to light and provided with water and carbon dioxide will produce glucose.
3. Use the comprehension questions to test learner understanding of the concepts.

## Tips and Extensions

The following description outlines how a common aquarium plant such as Elodea can be used to test the effect of light quality on the rate of photosynthesis in an aquatic plant. Elodea can be purchased easily at most pet stores that have well-stocked tropical fish sections. The leaves of this plant are small but rich in chloroplasts and respond well when exposed to bright light. It is important to provide your learners with good specimens that are equal in size, health, and vigour.

To demonstrate photosynthesis, fill two test tubes with water from a beaker. Insert a sprig of Elodea into each test tube. Be sure the sprigs are the same size.

Top up each test tube with more water, place your thumb over the top, and invert it in a partially filled beaker so that no air bubbles are trapped.

Place one beaker in a window exposed to direct sunlight. Place the other beaker in a dark location in the room.

Start a timer. In each of the two beakers, count the bubbles that rise to the top of the test tube over the next 30 minutes.

If you have access to microscopes, set up a couple where learners can observe live plant cells with chloroplasts. The common green alga *Spyrogyra* and its relatives have a very conspicuous spiral-shaped chloroplast that is easy to see. These alga form bright green filamentous masses in pond water in spring and early summer. You may also try using scrapings from the leaves of houseplants.

## Comprehension

You may wish to test learners' comprehension of the basics of photosynthesis using the following questions:

- Where in plant cells does photosynthesis occur? (chloroplasts)
- What is the name of the molecule that captures solar energy and helps convert it to chemical energy inside the cell? (chlorophyll)
- What are the main ingredients plant cells must have before they can undergo photosynthesis? (water, carbon dioxide and sunlight)
- What are the main by-products of photosynthesis? (oxygen and glucose)
- What is the significance of glucose? (It is used as food by all animals, and it provides energy for biological processes in all organisms, both plant and animal. It's also the basic building block of starch and cellulose.)