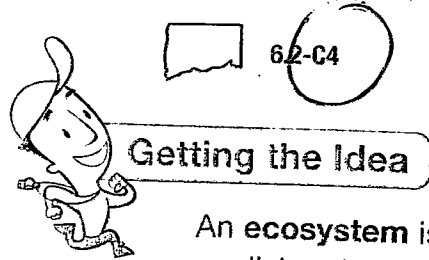


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18 Energy for Ecosystems

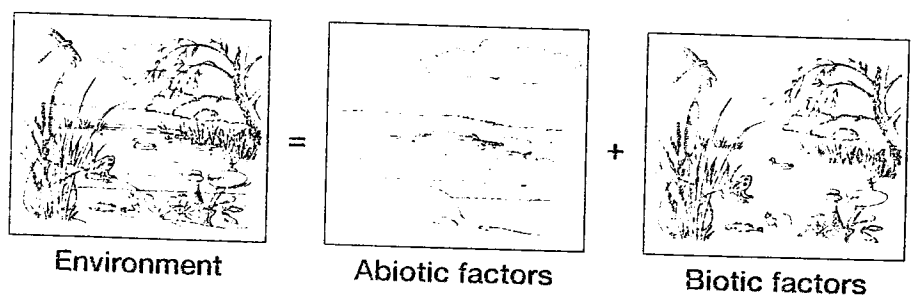


- Key Words**
- ecosystem
 - biotic factor
 - abiotic factor
 - photosynthesis
 - pollutant

An **ecosystem** is made up of all the living things and nonliving things that interact with each other in a certain place. The living things in an ecosystem depend on each other. They also rely on the nonliving things around them. In fact, nonliving parts of an ecosystem are the source of food for all living things. When one part of an ecosystem is disturbed, all the living things can be affected.

Biotic and Abiotic Factors

The living, or once-living, parts of an ecosystem are called **biotic factors**. Biotic factors include plants, animals, bacteria, fungi, and other organisms. **Abiotic factors** are the nonliving parts of an ecosystem. These include light, temperature, weather, soil, water, air, and minerals.

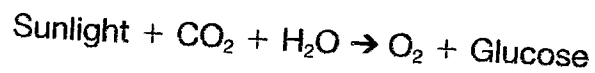


Energy cycles through ecosystems. It passes from one living thing to another. But the source of all that energy is an abiotic factor—sunlight. The sun is the main source of energy for almost all ecosystems on Earth. Plants, algae, and some bacteria use the energy of sunlight to make their own food. This food becomes the source of energy for all living things in the ecosystem.

Photosynthesis

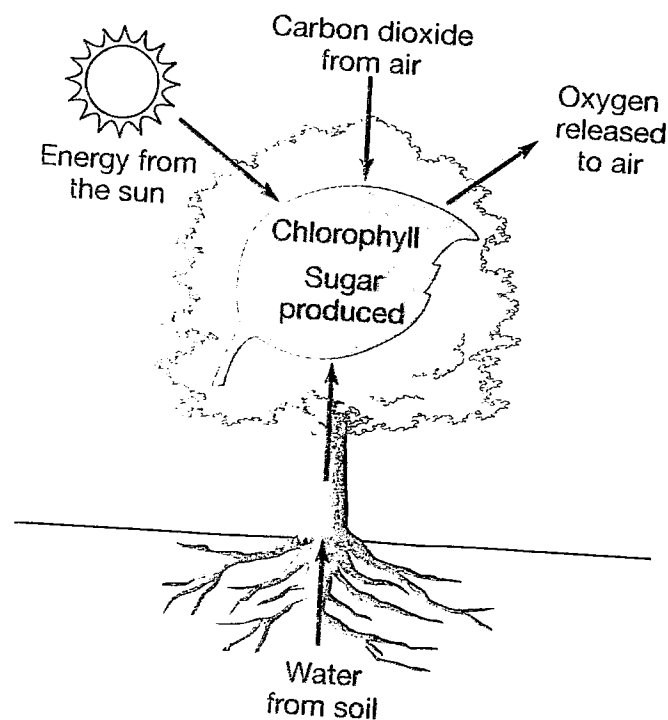
The process by which plants use the energy of sunlight to make their own food is called **photosynthesis**. In this process, carbon dioxide (CO_2) and water (H_2O) join chemically to produce oxygen and glucose. Glucose is an energy-rich sugar.

Photosynthesis



Photosynthesis happens in tiny structures called *chloroplasts*. In most plants, chloroplasts are found mainly in leaves. Chloroplasts contain a green pigment called *chlorophyll* that traps the energy of sunlight. It is this pigment that makes leaves and stems green. The trapped energy is used to change carbon dioxide and water into glucose and oxygen.

Carbon dioxide and water are abiotic factors that come from the ecosystem. Plants absorb water from the soil through their roots. Carbon dioxide is a gas in the air. Plants take in this gas through small openings in their leaves called *stomata*. Inside the leaves, water and carbon dioxide move to the chloroplasts. There, a series of chemical reactions produces glucose and oxygen. Plants use the glucose for food and release the oxygen into the air as waste.



Did You Know?

The term *biotic* comes from the Greek word *biotikos*, meaning "relating to or caused by living things." The prefix *a-* means "not." Thus *abiotic* means "not relating to or caused by living things."

Effects of Abiotic Factors on Photosynthesis

In order to make food, plants must have enough sunlight, water, and carbon dioxide. And other abiotic factors can affect the amounts of these that are available.

Weather can have big effects on photosynthesis. Cloudy skies limit the amount of sunlight that plants receive. High temperatures can cause soil to dry out. In hot weather, water from rainfall may evaporate before plants can take it in. At low temperatures, the water in soil may freeze. Plants' roots cannot take in frozen water. If too little rain falls, water lost to evaporation is not replaced.

Plants lose water through the stomata in their leaves. When plants do not get enough water, their stomata close. In that way, the plants conserve water, but they cannot take in carbon dioxide. They stop performing photosynthesis until they get more water.

Pollutants in the air can affect photosynthesis. A **pollutant** is an unwanted substance released into the environment. Human activities are the source of most air pollutants. Humans are part of most ecosystems. Humans affect both the biotic and abiotic factors in important ways.

DISCUSSION QUESTION

What is the function of a plant's leaves during photosynthesis?

Name _____ Date _____

C4

Lesson 18: Energy for Ecosystems

LESSON REVIEW

1. Which of these is an abiotic factor that all organisms need to survive?

- A. rock
- B. water
- C. algae
- D. grass

2. An example of a biotic factor is

- A. water.
- B. sunlight.
- C. a rotting log.
- D. temperature.

3. In what plant parts does photosynthesis take place?

- A. roots
- B. stomata
- C. chlorophyll
- D. chloroplasts

4. What is the original source of energy for living things in almost all ecosystems?

- A. water
- B. chlorophyll
- C. sunlight
- D. soil