

Carbon Cycle

Vocabulary

carbon cycle (KAHR buhn SEYE kuhl)
complex cycle in which carbon is exchanged between living things, the atmosphere, Earth's interior, and water

gas (gas) state of matter that does not take up a definite amount of space and has no definite shape

oxygen (AHK suh juhn) gas that makes up 20% of Earth's atmosphere

Using Science Words

1. Oxygen exists in the atmosphere as which state of matter?
 - A. solid
 - B. liquid
 - C. gas

- 1 Carbon is one of the most important elements on Earth. All living things have carbon in their cells. Organisms need carbon to survive. However, Earth has only a certain amount of carbon. Living things, though, are constantly being born and growing. So how do the increasing numbers of living things get the carbon they need?
- 2 Many elements move through living organisms and the nonliving environment in cycles. Carbon moves between the living and the nonliving environment in a process called the **carbon cycle**.
- 3 In the biosphere, or living environment, carbon exists in the cells of organisms. Carbon exists in the atmosphere as a **gas**. Carbon can also be found in the rocks that make up Earth's crust, also known as the geosphere. It is found dissolved in Earth's water, or hydrosphere, too.
- 4 An important part of the carbon cycle is the cycle between living things and the atmosphere. In the atmosphere, carbon (C) is attached to two oxygen (O) molecules. **Oxygen** is the gas that makes up about 20% of the air we breathe. When carbon is attached to oxygen, it forms a gas molecule called carbon dioxide (CO₂).
- 5 Carbon dioxide is toxic, or poisonous, to animals if they breathe in too much of it. Living things must get carbon in a form their cells can use. Green plants, algae, and some bacteria change carbon from the carbon dioxide gas into a complex molecule known as a sugar. Plants use water, carbon dioxide, and energy from the sun to make sugars. This process is called photosynthesis.
- 6 A molecule of sugar contains carbon. Plants get the carbon they need because they create their own sugar molecules. When animals eat plants, the animals get the carbon they need. Carbon becomes part of the cells of consumers through the food they eat. So when animals eat other animals who ate plants, the carbon is passed along to them. To complete the cycle, carbon must return to the atmosphere. Then plants can use it again. This happens in three main ways.
- 7 The first and most common way for carbon dioxide to reenter the atmosphere is through cellular respiration. When plants create sugars through photosynthesis, they release oxygen into the atmosphere as a by-product. Nearly all consumers then use this oxygen when they break down the sugars they eat. This breaking-down process is called cellular respiration. As respiration uses up oxygen, it produces carbon dioxide as a by-product. The carbon dioxide gas is released back into the atmosphere when an animal exhales.
- 8 The second way carbon dioxide reenters the atmosphere is through combustion. Combustion is the process of burning. Burning wood or fossil fuels, such as oil and gas, releases large amounts of carbon dioxide into the atmosphere. Because wood and fossil fuels are both made from plants, they have sugars stored within them. When they burn, those sugars are broken down. The carbon that was stored in the sugars is released into the atmosphere.
- 9 The third way carbon dioxide reenters the atmosphere is by decomposition. When an organism dies, decomposers go to work. They cause the dead tissue to decompose. That tissue has molecules containing carbon inside it. As the decomposers break down the tissue, they also break down the carbon-containing molecules. Carbon dioxide is released as the chemical compounds in dead tissue break down.

Comprehension

Write the letter of the best answer.

2. In the nonliving environment, carbon exists as a gas in _____.
 - a. cells
 - b. the geosphere
 - c. the atmosphere
3. Earth has a fixed amount of _____.
 - a. trees
 - b. carbon
 - c. carbon dioxide
4. Carbon enters the living world through the process of _____.
 - a. photosynthesis
 - b. respiration
 - c. combustion
5. In the atmosphere, carbon attaches to oxygen to form _____.
 - a. C
 - b. O
 - c. CO₂
6. The process of burning is called _____.
 - a. decomposition
 - b. combustion
 - c. respiration

Word Study

Context Clues You can often tell the meaning of a term by reading the words around it. Look in other sentences for clues about the meaning.

Look at each number in parentheses. Find the paragraph in the reading with the same number. Then find the term that fits the given meaning. Write the term.

7. an important element for living things (1)
8. CO₂ (4)
9. poisonous (5)
10. something extra produced during a process (7)
11. breaking down of dead things (9)

Nouns The words in **bold type** below are nouns. A noun is a word that indicates a person, place, or thing.

The **teacher** helped **Greg**. (persons)
The **laboratory** is located in **Chicago**. (places)
The **particles** in a **solid** move slowly. (things)

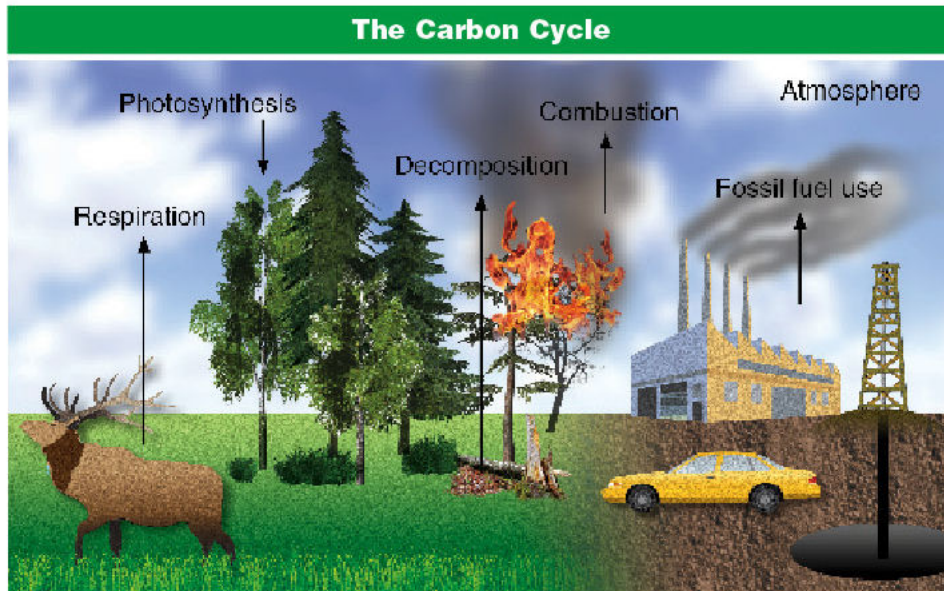
Each phrase below contains one noun. Write the noun.

12. cannot make any more carbon
13. the gas that makes up about
14. reenters the atmosphere by
15. cause the dead tissue to decompose
16. many scientists think

Standardized Test Practice

Test Tip

Diagrams Don't try to memorize all the information in a diagram. Quickly review the diagram. Then refer to the diagram as you answer questions.



Multiple Choice Use the diagram to answer the questions.

17. In this diagram, how many ways can carbon enter the living world?
- A. one
 - B. two
 - C. three
 - D. four
18. Burning fossil fuel has which effect in the carbon cycle?
- A. It removes carbon dioxide from the atmosphere.
 - B. It puts carbon dioxide under the ground.
 - C. It adds carbon dioxide to the atmosphere.
 - D. It has no effect in the carbon cycle.
19. Which process takes carbon dioxide out of the atmosphere?
- A. respiration
 - B. combustion
 - C. decomposition
 - D. photosynthesis

Using Science Words

1. C

Comprehension

2. c
3. b
4. a
5. c
6. b

Word Study

7. carbon
8. carbon dioxide
9. toxic
10. by-product
11. decomposition
12. carbon
13. gas
14. atmosphere
15. tissue
16. scientists

Standardized Test Practice

17. A
18. C
19. D

Writing About Science

Why is carbon one of the most important elements on Earth?