

INTRODUCTION TO ECOLOGY

Ecosystem Recycling

Read the passage below, which covers topics from your textbook. Answer the questions that follow.

All organisms need nitrogen to make proteins and nucleic acids. The complex pathway that nitrogen follows within an ecosystem is called the **nitrogen cycle**. However, most plants can use nitrogen only in the form of nitrate. The process of converting nitrogen gas to nitrate is called **nitrogen fixation**. Organisms rely on the actions of **nitrogen-fixing** bacteria that are able to transform nitrogen gas into a usable form. Nitrogen-fixing bacteria live in the soil and in the roots of some kinds of plants, such as beans, peas, clover, and alfalfa.

Decomposers break down the corpses and wastes of organisms and release the nitrogen they contain as ammonia, NH_3 , which in soil becomes ammonium, NH_4^+ . This process is known as **ammonification**. Through ammonification, nitrogen that would otherwise be lost is reintroduced into the ecosystem. Bacteria in the soil take up the ammonium and oxidize it into nitrites, NO_2^- , and nitrates, NO_3^- . This process is called **nitrification**. The erosion of nitrate-rich rocks also releases nitrates into an ecosystem. Plants use nitrates to form amino acids. Nitrogen is returned to the atmosphere through **denitrification**. Denitrification occurs when anaerobic bacteria break down nitrates and release nitrogen gas back into the atmosphere.

Write your answers in the spaces provided.

SKILL: Sequencing Information

1. Order the statements to show the steps by which nitrogen is recycled within an ecosystem. Write “1” on the line in front of the statement that describes what happens first. Write “2” on the line in front of the statement that describes what happens next, and so on.

- _____ a. Bacteria in the soil oxidize the ammonia into nitrites and nitrates.
- _____ b. Plants use nitrates to form amino acids.
- _____ c. Decomposers break down corpses and wastes of organisms.
- _____ d. Nitrogen is released into the ecosystem as ammonia.

Complete the sentence by logically finishing the thought.

SKILL: Completing Sentences

2. The process by which bacteria in soil oxidize ammonium to form nitrates and nitrites is known as _____.
3. Denitrification occurs when _____ break down nitrates and release nitrogen gas back into the atmosphere.
4. Nitrogen fixation is the process of converting _____ to nitrate.
5. The organisms that convert nitrogen gas to nitrate are known as _____
_____.
6. The nitrogen cycle is the pathway through which nitrogen flows within a(n) _____.

Read the question and write your answer in the space provided.

SKILL: Vocabulary Development

7. The suffix *-tion* means “the act or state of.” How does knowledge of this word part aid in decoding the word *ammonification*?

Circle the letter of the phrase that best completes the statement.

8. All organisms need nitrogen to
 - a. make proteins.
 - b. make nucleic acids.
 - c. produce ammonia.
 - d. Both (a) and (b)