

SECTION
4.1

CHEMICAL ENERGY AND ATP
Study Guide

KEY CONCEPT

All cells need chemical energy.

VOCABULARY

ATP	ADP	chemosynthesis
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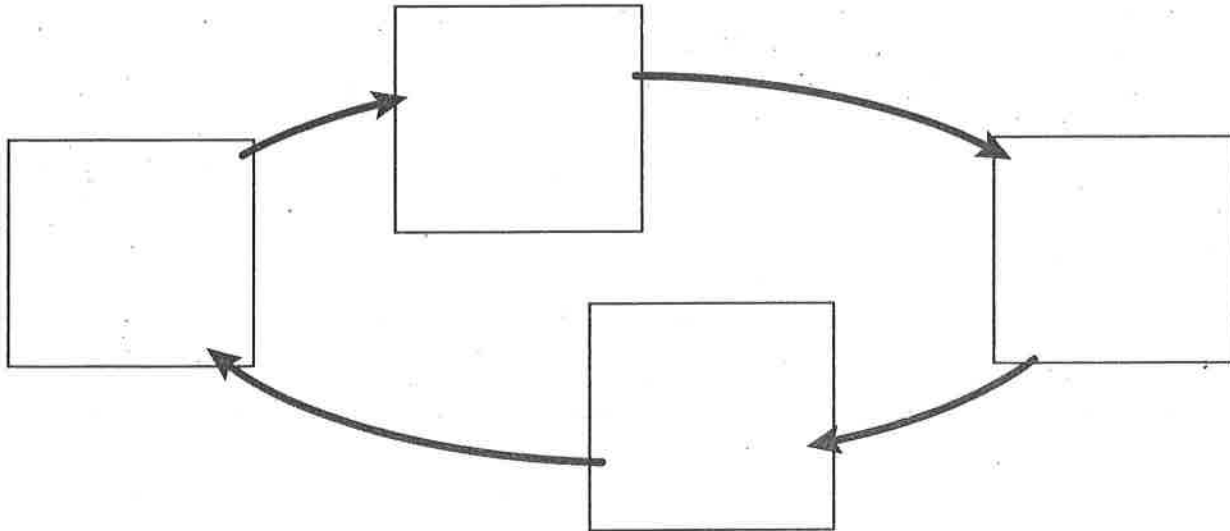
MAIN IDEA: The chemical energy used for most cell processes is carried by ATP.

1. What do all cells use for energy?

2. What is ATP?

3. What is the relationship between ATP and ADP?

Fill in the four parts of the cycle diagram below to take notes on the relationship between ATP and ADP.



STUDY GUIDE, CONTINUED

MAIN IDEA: Organisms break down carbon-based molecules to produce ATP.

Use the table below to organize your notes about the different types of molecules that are broken down to make ATP.

Type of Molecule	Role in ATP Production
Carbohydrates	4.
Lipids	5.
Proteins	6.

MAIN IDEA: A few types of organisms do not need sunlight and photosynthesis as a source of energy.

7. What is chemosynthesis?

Vocabulary Check

8. The prefix *tri-* means “three,” and the prefix *di-* means “two.” How do these prefixes tell you the difference between adenosine triphosphate (ATP) and adenosine diphosphate (ADP)?

9. The prefix *chemo-* means “chemical,” and *synthesis* comes from a Greek word that means “to put together.” How do these meanings tell you what chemosynthesis does?

SECTION

4.2

OVERVIEW OF PHOTOSYNTHESIS

Study Guide**KEY CONCEPT**

The overall process of photosynthesis produces sugars that store chemical energy.

VOCABULARY

photosynthesis

light-dependent reactions

chlorophyll

light-independent reactions

thylakoid

MAIN IDEA: Photosynthetic organisms are producers.

1. Why are some organisms called producers?

2. What is the function of photosynthesis?

3. What is chlorophyll?

MAIN IDEA: Photosynthesis in plants occurs in chloroplasts.

4. What are chloroplasts?

5. In which two parts of a chloroplast does photosynthesis take place?

6. What are thylakoids?

7. Write the chemical equation for the overall process of photosynthesis. Then explain what the equation means and identify the reactants, products, and the meaning of the several arrows.

8. What are the differences between the light-dependent reactions and the light-independent reactions?

STUDY GUIDE, CONTINUED

Use the space below to sketch and label a chloroplast. On the sketch, write the four steps of the photosynthesis process.

Photosynthesis**Vocabulary Check**

9. The prefix *photo-* means "light," and *synthesis* means "to put together." How do those meanings tell you what happens during photosynthesis?
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10. The prefix *chloro-* means "green," and the suffix *-phyll* means "leaf." How are these meanings related to chlorophyll?
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11. The prefix *in-* means "not." How does this meaning tell you which reactions in photosynthesis require light, and which reactions do not?
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-

SECTION

4.1

CHEMICAL ENERGY AND ATP

Choose the letter of the best answer.

- _____ 1. Which of the following statements is true for *all* cells?
- a. They use solar energy.
 - b. They use photosynthesis.
 - c. They use chemical energy.
 - d. They use chemosynthesis.
- _____ 2. Which phrase best describes the function of the ATP molecule?
- a. stores energy
 - b. carries energy
 - c. absorbs energy
 - d. converts energy
- _____ 3. Where does the chemical energy to produce ATP come from?
- a. the conversion of ATP to ADP
 - b. the use of chemicals from the environment to build sugars
 - c. the addition of a phosphate group to ATP
 - d. the breakdown of carbon-based molecules into smaller molecules
- _____ 4. Energy is released from an ATP molecule for cellular processes when it
- a. has a phosphate group removed.
 - b. stores an extra phosphate group.
 - c. converts a phosphate group to ADP.
 - d. produces a sugar molecule.
- _____ 5. Which of the following is the source of energy used in chemosynthesis?
- a. sunlight
 - b. heat from hydrothermal vents
 - c. chemical compounds
 - d. amino acids

SECTION
4.2

OVERVIEW OF PHOTOSYNTHESIS

Choose the letter of the best answer.

- _____ 1. Which of the following statements best describes the process of photosynthesis?
- Plants use oxygen to make simple sugars.
 - Chlorophyll builds sugars in the thylakoid membrane.
 - Light breaks down water molecules and releases carbon dioxide.
 - Chloroplasts absorb sunlight and store chemical energy.
- _____ 2. What is the term for an organism that makes its own source of chemical energy?
- decomposer
 - producer
 - chloroplast
 - protist
- _____ 3. The main light-absorbing molecules found in plant leaves are called
- chloroplasts.
 - thylakoids
 - chlorophyll.
 - grana.
- _____ 4. The function of the light-dependent reactions is to
- build sugars.
 - capture and transfer energy.
 - release carbon dioxide.
 - form water molecules.
- _____ 5. The light-independent reactions of photosynthesis need
- carbon dioxide.
 - oxygen.
 - water.
 - cellulose.

Short Answer Use the diagram below to answer items 16–20. (5 credits)

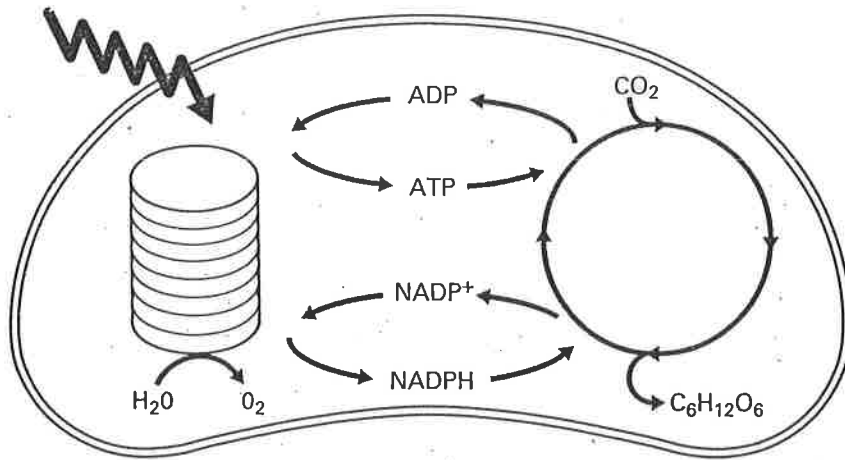


FIG. 4.3

16. Write a simple title for the diagram above.

17. What does the large zigzagging arrow represent?

18. Name one high-energy molecule shown in the diagram that is used as an energy-carrier.

19. Name the structure in the figure in which an electron transport chain is located. Describe the main function of the processes that occur in this structure.

20. What is the name of the cycle represented by a circle in the diagram? Where does the carbon dioxide necessary for this process come from?

