Name Period Date

SECTION 4.1 | CHEMICAL ENERGY AND ATP

Study Guide

KEY CONCEPT

All cells need chemical energy.

VOCABULARY		
ATP	ADP	chemosynthesis

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

1. What do all cells use for energy?

ATP

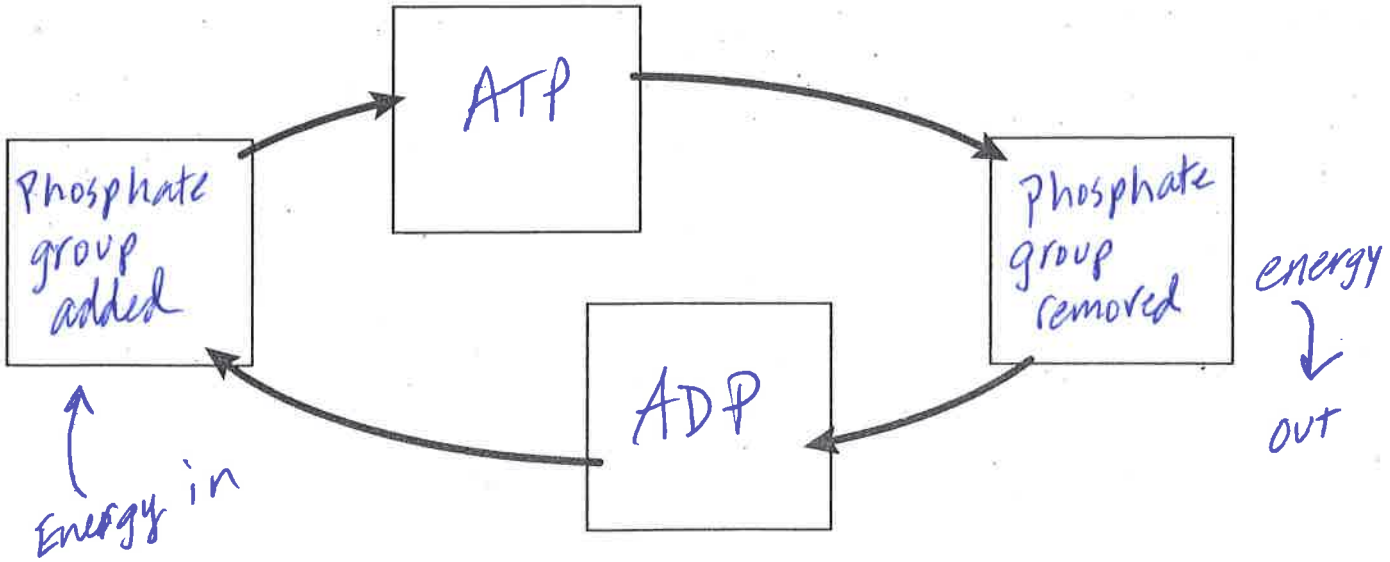
2. What is ATP?

Adenosine Tri Phosphate

3. What is the relationship between ATP and ADP?

ATP minus a Phosphorus gives 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. glucose, made in photosynthesis used to make ATP
Lipids	5. storage molecule, store most energy, harder to break down than carbohydrates
Proteins	6. store some energy, same amount as carbohydrates, not used to make ATP very often, needed for body processes

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

7. What is chemosynthesis?
very few plants that live where there is no light energy make their sugars from chemicals

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)?
ATP - 3 phosphates ADP - 2 phosphates

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?
chemosynthesis - putting together sugars using chemicals

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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?

Because they produce, or make, chemical Energy

2. What is the function of photosynthesis?

To Convert Light Energy into Chemical Energy

3. What is chlorophyll?

Light absorbing pigment in photosynthetic Organisms

MAIN IDEA: Photosynthesis in plants occurs in chloroplasts.

4. What are chloroplasts?

Organelle used for photosynthesis

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

Granum/thylakoid & Stroma

6. What are thylakoids?

Coin Shaped Membrane containing chlorophyll

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.

$6CO_2 + 6H_2O \xrightarrow{\text{sunlight}} C_6H_{12}O_6 + 6O_2$

Reactants — Many steps — products

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

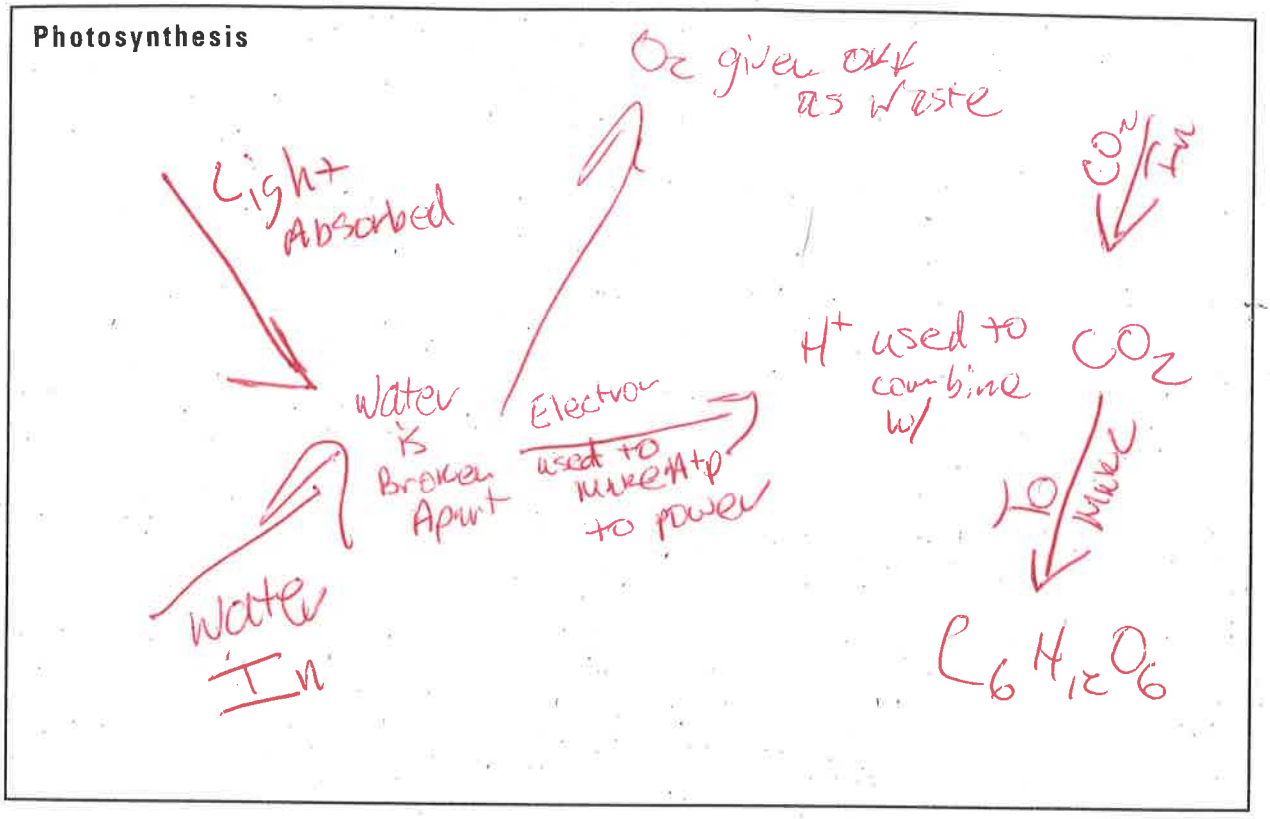
Light Dependent need light to split water

Light independent don't need light

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?

to put together something with light

10. The prefix *chloro-* means "green," and the suffix *-phyll* means "leaf." How are these meanings related to chlorophyll?

Chlorophyll is green and in the leaves

11. The prefix *in-* means "not." How does this meaning tell you which reactions in photosynthesis require light, and which reactions do not?

light independent means does not use light

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SECTION 4.1 | CHEMICAL ENERGY AND ATP

Choose the letter of the best answer.

C 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.

B 2. Which phrase best describes the function of the ATP molecule?

a. stores energy
b. carries energy
c. absorbs energy
d. converts energy

D 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

A 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.

C 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

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SECTION 4.2 | OVERVIEW OF PHOTOSYNTHESIS

Choose the letter of the best answer.

D 1. Which of the following statements best describes the process of photosynthesis?

a. Plants use oxygen to make simple sugars.
b. Chlorophyll builds sugars in the thylakoid membrane.
c. Light breaks down water molecules and releases carbon dioxide.
d. Chloroplasts absorb sunlight and store chemical energy.

B 2. What is the term for an organism that makes its own source of chemical energy?

a. decomposer
b. producer
c. chloroplast
d. protist

C 3. The main light-absorbing molecules found in plant leaves are called

a. chloroplasts.
b. thylakoids
c. chlorophyll.
d. grana.

B 4. The function of the light-dependent reactions is to

a. build sugars.
b. capture and transfer energy.
c. release carbon dioxide.
d. form water molecules.

A 5. The light-independent reactions of photosynthesis need

a. carbon dioxide.
b. oxygen.
c. water.
d. cellulose.

CHAPTER 4 Cells and Energy

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

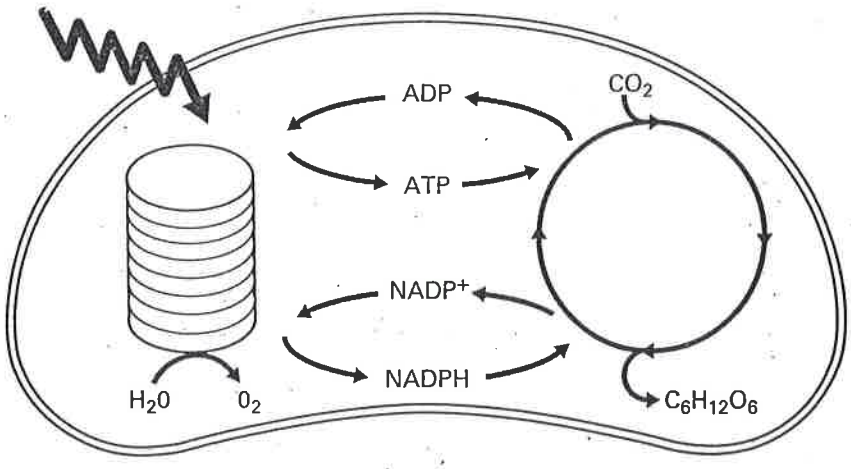

FIG. 4.3

16. Write a simple title for the diagram above.

photosynthesis

17. What does the large zigzagging arrow represent?

energy from sunlight

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

NADPH or ATP

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.

in the thylakoid membrane, function absorb sunlight and transfer it to light-independent reactions

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?

Calvin cycle the CO_2 comes from the atmosphere