**SECTION**



4.1

CHEMICAL ENERGY AND ATP

Reinforcement

Directions: Read the passage below and practice marking the text. Place and exclamation point next to important words, a question mark next to confusing ideas, circle vocabulary words and underline words you don’t know. Write a summary sentence next to each paragraph.

KEY CONCEPT All cells need chemical energy.

All cells need chemical energy for their functions. The energy that your cells need

comes indirectly from the food you eat. The chemical energy used by all cells is carried

by a molecule called adenosine triphosphate, or ATP. **ATP** is a molecule that transfers energy from the breakdown of molecules in food to cell processes.

A molecule of ATP has three phosphate groups. The energy carried by ATP is released when the third phosphate group is removed from the molecule by a chemical reaction. When the phosphate group is removed and energy is released, ATP is converted into a molecule called adenosine diphosphate, or ADP. **ADP** is a lower-energy molecule that

can be changed back into ATP by the addition of another phosphate group.

Different types of carbon-based molecules (carbohydrates, lipids, and proteins) can be broken down to produce ATP. The breakdown of the different molecules produces different amounts of ATP. Carbohydrates, especially the simple sugar glucose, are

CHAPTER 4

Cells and Energy

most commonly broken down to make ATP. The breakdown of a lipid produces many more ATP molecules than does the breakdown of a sugar. Proteins are the molecules least likely to be broken down, but they store about the same amount of energy as carbohydrates.

Many organisms must eat other organisms to get the carbon-based molecules they need

to make ATP. Some organisms, such as plants, use a process called photosynthesis to make their own food molecules. Other organisms that survive without light can make their own food molecules through a process called **chemosynthesis.**

Copyright by McDougal Littell, a division of Houghton Mifflin Company

1. What is the function of ATP?

2. What is ADP?

3. Which types of carbon-based molecules can be broken down to make ATP?

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

4. . What is chemosynthesis?

Vocabulary Check

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

6. 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?

Fill in the four parts of the cycle diagram below to take notes on the relationship between

ATP and ADP.

Short Answer: Explain why we do not get our energy directly from the food we eat. (3-4 Sentences)

\_