

Lesson Self-Check

CAN YOU EXPLAIN IT?

FIGURE 32: Carbon is essential to life on Earth.



Carbon is often called the building block of life because carbon atoms are the central component of most molecules that make up living things. These molecules form the structure of living things and carry out most of the processes that keep organisms alive. Carbon is so important because its atomic structure gives it bonding properties that are unique among elements.

Carbon atoms can arrange themselves into the molecules that make up your food and your clothes. Carbon-based materials are also used for many technical applications, such as electronics, optics, and even the rubber in tires.



Explain How can carbon be the central component of so many different types of molecules? Write an explanation that answers these questions:

1. How do the properties of carbon allow it to form a variety of different molecules?
2. What evidence is there that chemical reactions in organisms' cells break apart and rearrange carbon-based molecules?
3. How is energy from biomolecules transferred to cell processes in living things?

CHECKPOINTS

Check Your Understanding

- Suppose you are going to draw models of the four main biomolecules. Which statement describes how the models will be similar?
 - They will all be formed around carbon chains and rings.
 - They will all include a chain of amino acids.
 - They will all have hydrocarbon chains connected only by double bonds.
 - They will all include a sugar, a phosphate group, and a base.
- Which of these evidence statements should you include in an explanation of the relationship among carbon, amino acids, and proteins? Select all correct answers.
 - Amino acids are polymers made up of proteins.
 - Proteins are polymers made up of amino acids.
 - Proteins and amino acids are polymers because they contain multiple carbon atoms.
 - Amino acids are monomers made up mostly of carbon, hydrogen, nitrogen, and oxygen.

- Use these terms to complete the statement explaining how living things obtain and use the molecules necessary for life:

ATP, glucose, cell processes, cellular respiration, photosynthesis

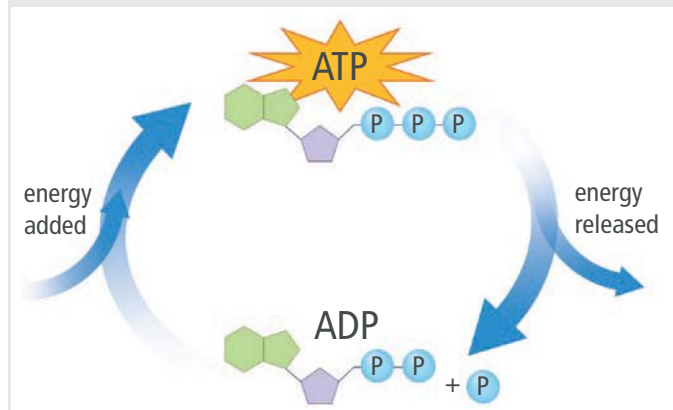
Some living things, such as plants and algae, transfer energy from sunlight to _____ molecules. This process is known as _____. Virtually all living things transfer energy from these molecules to another molecule called _____, which provides the energy for _____. The process that produces this molecule is called _____.

- Use these terms to complete the statement explaining how enzymes carry out chemical reactions in living things:

bonds, shape, proteins, temperature

Enzymes are _____ that help break chemical _____, as well as form new ones. Enzymes require specific environmental conditions related to _____ and pH to properly function. If these conditions are not met, the _____ of the enzyme may change. This could result in a nonfunctional enzyme that cannot carry out chemical reactions.

FIGURE 33: Formation and Breakdown of ATP



- Use the model in Figure 33 to write an explanation for how ATP stores energy and how this energy is released for cell processes.
- Which type of transport across the membrane requires ATP—facilitated diffusion or active transport? Explain your answer.
- Draw a Venn diagram to compare and contrast carbohydrates and lipids. Include terms related to the molecular structures, functions, and energy content of these molecules.

MAKE YOUR OWN STUDY GUIDE



In your Evidence Notebook, design a study guide that supports the main ideas from this lesson:

Organisms are made up of carbon-based molecules.

Carbon-based molecules are broken down and rearranged in organisms' cells to form new molecules and obtain energy.

Remember to include the following information to your study guide:

- Use examples that model main ideas.
- Record explanations for the phenomena you investigated.
- Use evidence to support your explanations. Your support can include drawings, data, graphs, laboratory conclusions, and other evidence recorded throughout the lesson.

Consider how the models in this lesson can be used to compare and contrast different types of carbon-based molecules.