مراجعة هيكل - تحولات الطاقة وقوانين الديناميكا الحرارية



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المزيد من الملفات بحسب الصف الحادي عشر المتقدم والمادة أحياء في الفصل الأول	
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الأحياء

مراجعة هيكل

للصف الحادي عشر متقدم



دكتور

كريم زهو

- **1. Transformation of Energy**
- Many chemical reactions and processes in cells are ongoing, even when you are not aware of using energy.
- Macromolecules are assembled and broken down.
- Substances are transported across cell membranes.
- Genetic instructions are transmitted.
- All cellular activities require energy, which is the ability to do work.
- **Thermodynamics** is the study of the flow and transformation of energy in the universe.

- **2. Laws of Thermodynamics**
- First Law: Law of Conservation of Energy
- Energy can be converted from one form to another.
- Energy cannot be created or destroyed.
- Example: Stored energy in food is converted into:
- Chemical energy when you eat.
- Mechanical energy when you run or kick a ball.

- **Second Law of Thermodynamics**
- **Energy cannot be converted without the loss of usable energy.**
- **Lost energy is generally converted into thermal energy.**
- **Entropy is the measure of disorder or unusable energy in a system.**
- **The second law can also be stated as: Entropy increases.**
- **In food chains:**
- **Usable energy decreases at each step.**
- **Less energy is available to the next trophic level.**

QUESTIONS

- **Q1. What is the ability to do work called?**
- **A) Entropy**
- **B) Energy**
- **C) Thermodynamics**
- **D) Conservation**

- **Q2. Which law states that energy cannot be created or destroyed?**
- **A) First law of thermodynamics**
- **B) Second law of thermodynamics**
- **C) Law of entropy**
- **D) Law of motion**

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- **Q3. What is entropy?**
- A) The measure of stored energy
- B) The measure of chemical energy
- C) The measure of disorder or unusable energy
- D) The measure of mechanical energy

- **Q4. What happens to usable energy at each step in a food chain?**
- A) It increases
- B) It remains constant
- C) It decreases
- D) It disappears completely

- **Q5. How do heterotrophs obtain their energy?**
- A) By making their own food
- B) From other organisms
- C) Directly from sunlight only
- D) Through photosynthesis

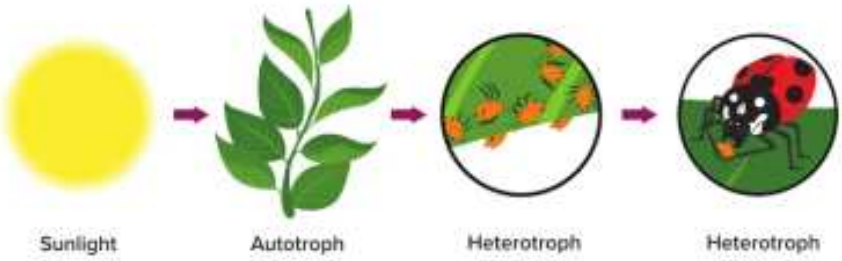


Figure 2 Almost all the energy in living organisms originates from the Sun, and energy flows from autotrophs to heterotrophs.

- **1. Energy Flow Between Organisms**
- Almost all energy in living organisms originates from the Sun.
- Energy flows from autotrophs to heterotrophs.
- Autotrophs make their own food.
- Chemoautotrophs use inorganic substances such as hydrogen sulfide as a source of energy.
- Photoautotrophs convert light energy from the Sun into chemical energy.
- Heterotrophs obtain energy by ingesting food (e.g. aphids and ladybugs).

- **2. Metabolism**
- **Metabolism: All chemical reactions that occur inside a cell.**
- **Chemical elements are recombined in different ways to form different products.**
- **Metabolic pathway: A series of chemical reactions in which the product of one reaction becomes the substrate for the next reaction.**
-
- **There are two main types of metabolic pathways:**
- **A. Catabolic pathways**
- **Break down large molecules into smaller molecules.**
- **Release energy.**

B. Anabolic pathways

- **Build larger molecules from smaller molecules.**
- **Use energy released by catabolic pathways.**
- **Energy is transferred from one system of interacting molecules to another.**

3. Energy Flow Between Organisms

- Energy continually flows between organisms.

A. Photosynthesis

- **An anabolic pathway.**
- **Converts light energy into stored chemical energy.**
- **Uses carbon dioxide (CO_2) and water (H_2O).**
- **Produces sugars and releases oxygen (O_2).**
- **Energy stored in glucose is transferred to other organisms when consumed as food.**

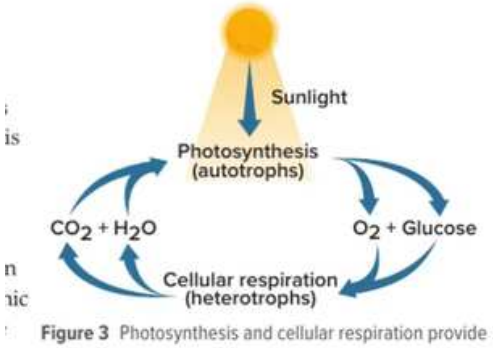


Figure 3 Photosynthesis and cellular respiration provide most of the energy for life processes.

- **B. Cellular Respiration**
- **A catabolic pathway.**
- **Breaks down organic molecules to release energy.**
- **Uses oxygen (O_2) to break down organic molecules.**
- **Produces carbon dioxide (CO_2) and water (H_2O).**

- **4. ATP: The Unit of Cellular Energy**
- **Energy exists in different forms, such as:**
- **Mechanical energy.**
- **Chemical energy.**
- **Chemical energy stored in biological molecules can be converted into other forms.**
- **Example: Chemical energy is converted into mechanical energy when muscles contract.**
- **ATP (Adenosine Triphosphate): The most important biological molecule that provides chemical energy.**

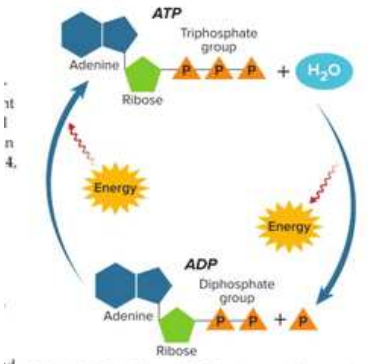


Figure 4 The breakdown of ATP releases energy for powering cellular activities in organisms.

- **1. ATP Structure**
- **ATP (Adenosine Triphosphate): A multipurpose powerhouse of chemical energy used by cells in various reactions.**
- **ATP is the most abundant energy-carrier molecule in cells.**
- **ATP is found in all types of organisms.**
- **ATP plays an important role in energy transfer within cells.**
- **ATP is a nucleotide made of three components:**
- **Adenine: A nitrogenous base.**
- **Ribose: A sugar.**
- **Three phosphate groups.**

- **2. ATP Function**
- ATP releases energy when the bond between the second and third phosphate groups is broken.
- This reaction produces:
- ADP (Adenosine Diphosphate).
- A free phosphate group (Pi).
- Released energy.

- **3. ATP and ADP Interconversion**
- Energy is stored when ADP receives a phosphate group and becomes ATP.
- ATP and ADP can be interchanged by:
- Addition of a phosphate group.
- Removal of a phosphate group.
- ADP can become AMP (Adenosine Monophosphate) by losing an additional phosphate group.
- Less energy is released in the conversion of ADP to AMP.
- Most energy reactions in cells involve conversions between ATP and ADP.

QUESTIONS

- **Q1. Which organisms make their own food?**
- A) Heterotrophs
- B) Autotrophs
- C) Decomposers
- D) Consumers

- **Q2. Which substances do chemoautotrophs use as a source of energy?**
- A) Organic sugars
- B) Sunlight
- C) Inorganic substances such as hydrogen sulfide
- D) Oxygen only

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- **Q3. Photoautotrophs convert light energy into which type of energy?**
- A) Mechanical energy
- B) Thermal energy
- C) Electrical energy
- D) Chemical energy

- **Q4. How do heterotrophs obtain energy?**
- A) By ingesting food
- B) By absorbing sunlight directly
- C) By making their own food
- D) By using hydrogen sulfide only

- **Q5. What is metabolism?**
- A) The movement of organisms
- B) All chemical reactions in a cell
- C) The breakdown of ATP only
- D) The transport of oxygen only

- **Q6. What is a metabolic pathway?**
- A) A single reaction that produces energy
- B) A pathway for transporting food
- C) A series of reactions where one product becomes the next substrate
- D) A process that occurs only outside cells

- **Q7. How many main types of metabolic pathways are described?**
- A) Two
- B) Three
- C) Four
- D) Five

- **Q8. What happens during catabolic pathways?**
- A) Small molecules are combined into larger molecules
- B) Light energy is converted into sugars
- C) Energy is stored without breaking molecules
- D) Large molecules are broken down into smaller molecules

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- **Q9. Which type of metabolic pathway builds larger molecules from smaller molecules?**
- **A) Catabolic pathway**
- **B) Anabolic pathway**
- **C) Cellular respiration**
- **D) Transport pathway**

- **Q10. Which pathways release energy by breaking down large molecules?**
- **A) Anabolic pathways**
- **B) Photosynthetic pathways**
- **C) Catabolic pathways**
- **D) Transport pathways**

- **Q11. Photosynthesis is classified as which type of metabolic pathway?**
- **A) Catabolic**
- **B) Anabolic**
- **C) Respiratory**
- **D) Neither anabolic nor catabolic**

- **Q12. Which substances are used during photosynthesis?**
- **A) Oxygen and glucose**
- **B) Carbon dioxide and water**
- **C) ATP and oxygen**
- **D) Glucose and water only**

- **Q13. Which gas is released during photosynthesis?**
- **A) Carbon dioxide**
- **B) Nitrogen**
- **C) Hydrogen**
- **D) Oxygen**

- **Q14. Cellular respiration is classified as which type of pathway?**
- **A) Anabolic**
- **B) Photosynthetic**
- **C) Catabolic**
- **D) Chemoautotrophic**

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- **Q15. Which substances are produced during cellular respiration?**
- A) Carbon dioxide and water
- B) Oxygen and glucose
- C) Carbon dioxide and glucose
- D) Oxygen and water only

- **Q16. What does ATP stand for?**
- A) Adenosine Diphosphate
- B) Adenosine Triphosphate
- C) Adenine Triphosphate
- D) Adenosine Monophosphate

- **Q17. Which components make up an ATP molecule?**
- A) Adenine, glucose and two phosphate groups
- B) Ribose, oxygen and three phosphate groups
- C) Adenine, ribose and three phosphate groups
- D) Adenine, ribose and one phosphate group

- **Q18. Between which phosphate groups is the bond broken to release energy from ATP?**
- A) Between the first and second
- B) Between adenine and ribose
- C) Between ribose and the first phosphate
- D) Between the second and third

- **Q19. What are the products formed when ATP releases energy?**
- A) ADP and a free phosphate group
- B) AMP and two free phosphate groups
- C) ATP and glucose
- D) Adenine and ribose only

- **Q20. How does ADP become ATP?**
- A) By losing a phosphate group
- B) By receiving a phosphate group
- C) By losing adenine
- D) By breaking down ribose

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