

Homework

Chapter 4: Lesson (1) Biotechnology in energy development

Choose the correct answer

- 1. The process of converting organic materials into energy using living organisms is called.....
 - A) Distillation
 - B) Biological decomposition
 - C) Combustion
 - D) Fermentation

2. Biotechnology is defined as the use of.....

- A) Air to produce energy
- B) Living organisms or their components to achieve specific goals
- C) Minerals to generate electricity
- D) Water to produce electricity

3. Biofuel is defined as a type of energy source produced from.....

- A) Living organisms
- B) Minerals
- C) Air
- D) Water

4. Acidogenesis refers to the process of converting.....

- A) Sugars and amino acids into short-chain fatty acids or alcohol
- B) Fatty acids into sugars
- C) Alcohol into amino acids
- D) Fatty acids into glucose

5. Starch can be converted to glucose in the biological decomposition by....

- A) hydrolysis
- B) sodium hydroxide
- C) algae
- D) bacteria

6. What is the main role of biotechnology in the development of energy sources?

- A) Improving the efficiency of converting living organisms into energy
- B) Increasing the size of living organisms
- C) Improving the color of living organisms
- D) Reducing the weight of living organisms
- 7. What is the vital role of biotechnology in achieving sustainable development?
 - A) Improving the efficiency of using natural resources
 - B) Increasing the consumption of natural resources
 - C) Improving air quality
 - D) Increasing humidity levels in the air
- 8. The process at which, bacteria break down complex organic matter into simpler units, such as carbohydrates, proteins, and fats into simple sugars, amino acids, and fatty acids, respectively.
 - A) Acidogenesis
 - B) Acetogenesis
 - C) Hydrolysis
 - D) Methanogenesis
- 9. Starch (a carbohydrate) is broken down into glucose as the following chemical equation: (C₆H₁₀O₅) n+ H₂O → nC₆H₁₂O₆
 - is considered.....
 - A) Acidogenesis
 - B) Acetogenesis
 - C) Hydrolysis
 - D) Methanogenesis

10.The stage at which, methanogenic bacteria convert acetic acid or carbon dioxide and hydrogen into methane gas (CH₄).

- A) Acidogenesis
- B) Acetogenesis

C) Hydrolysis

D) Methanogenesis

methanogenic bacteria

- **11.** $CO_2 + 4H_2$
 - A) $CH_4 + CO_2$
 - B) $CH_4 + H_2O$
 - C) $CH_4 + CO_2 + H_2O$
 - D) C + CO₂ + H₂O
- 12. Why biological decomposition is considered an important process in waste management? Because it.....
 - A) increases the waste volume
 - B) turns waste into energy and reduces its size
 - C) increases pollution
 - D) requires more energy

13. One of the environmental benefits of using biofuels is.....

- A) Reducing carbon emissions
- B) Increasing pollution
- C) Increasing energy consumption
- D) Increasing oxygen

14. Biological decomposition is the process of converting.....

- A) Organic matter into energy using living organisms
- B) Converting water into energy
- C) Converting air into energy
- D) Converting minerals into energy

15. When vegetable oils or animal fats react with alcohol in the presence of

Sodium hydroxide as a catalyst, it produces.....

- A) Biodiesel
- B) Hydrogen
- C) Glucose
- D) Amino acids

16. Which of the following is considered the main stages of biological decomposition?

- A) Acidogenesis, Acetogenesis, Hydrolysis, Methanogenesis
- B) Hydrolysis, pyrolysis, chemical decomposition, electrolysis
- C) Aerobic fermentation, photodecomposition, chemical decomposition, biological decomposition
- D) Chemical decomposition, pyrolysis, electrolysis, photodecomposition

17. Methanogen bacteria play a key role by converting.....

- A) Acetic acid or carbon dioxide and hydrogen into methane gas
- B) Sugars into amino acids
- C) Fatty acids into sugars
- D) Alcohol into amino acids

18. How can the environmental impact of biofuel production be reduced?

- A) By using advanced technologies to reduce emissions
- B) By increasing the volume of organic materials
- C) By analyzing organic materials using fungi
- D) By analyzing organic materials using plants

Second: Essay Questions

Answer the following:

1. Explain that bioethanol is a biofuel

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2. <u>Explain</u> the basic steps of the biological decomposition process and how methane gas is produced.

- 3. What is the result(s) of each of the following: -1) the hydrolysis of protein
 - 2) the hydrolysis of the starch
 - 3) the hydrolysis of fats
 - 4) adding yeast to glucose

5) adding vegetables oils to ethanol in the presence of sodium hydroxide

6) adding methanogenic bacteria to acetic acid

7) adding methanogenic bacteria to carbon dioxide gas and hydrogen gas