ACC Biology Accuplacer Practice Test (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. **Which organelle plays a major role in lipid synthesis and drug detoxification?**
   - **A. Rough ER**
   - **B. Smooth ER**
   - **C. Lysosomes**
   - **D. Mitochondria**

2. **What term describes a substance that alters the rate of a chemical reaction without being consumed or permanently changed?**
   - **A. Catalyst**
   - **B. Reactant**
   - **C. Inhibitor**
   - **D. Enzyme**

3. **Which of the following substances is a common biological catalyst?**
   - **A. DNA**
   - **B. Protein**
   - **C. Water**
   - **D. Salt**

4. **What is a phenotype?**
   - **A. The genetic constitution of an organism**
   - **B. The observable characteristics of an organism**
   - **C. The location of genes on a chromosome**
   - **D. The evolutionary history of a species**

5. **What is the primary function of peroxisomes in a cell?**
   - **A. Protein synthesis**
   - **B. Lipid metabolism**
   - **C. Detoxification of harmful chemicals**
   - **D. Energy production**

6. What are the two main types of cells?

- **A. Prokaryotic and eukaryotic**
- **B. Animal and plant**
- **C. Multicellular and unicellular**
- **D. Haploid and diploid**

7. What is primarily contained within peroxisomes in a cell?

- **A. Ribosomal RNA**
- **B. Oxidase enzymes**
- **C. Protein enzymes**
- **D. Cellular debris**

8. What are mitochondria commonly referred to as?

- **A. Cell builders**
- **B. Powerhouses of the cell**
- **C. Transporters of nutrients**
- **D. Storage sacs**

9. What is another name for a coordinate covalent bond?

- **A. Double bond**
- **B. Single bond**
- **C. Dative bond**
- **D. Triple bond**

10. What combines NAD+ with pyruvate to form NADH and acetyl coenzyme A?

- **A. Glycolysis**
- **B. Transition stage**
- **C. Kreb cycle**
- **D. Electron transport cycle**

Answers

1. B
2. A
3. B
4. B
5. C
6. A
7. B
8. B
9. C
10. B

Explanations

1. Which organelle plays a major role in lipid synthesis and drug detoxification?

A. Rough ER

B. Smooth ER

C. Lysosomes

D. Mitochondria

The smooth endoplasmic reticulum (Smooth ER) is the organelle primarily responsible for lipid synthesis and drug detoxification. Unlike the rough endoplasmic reticulum, which is studded with ribosomes and is involved in protein synthesis, the smooth ER has a smooth appearance and plays a critical role in the metabolism of lipids. It is integral in synthesizing phospholipids and cholesterol, which are essential components of cellular membranes. In addition to lipid synthesis, the smooth ER is involved in the detoxification of drugs and other harmful substances, particularly in liver cells. Enzymes located in the smooth ER modify these substances to make them less toxic and easier for the body to eliminate. This detoxification process is important for maintaining homeostasis and protecting the body from potential damage caused by environmental toxins. While the rough ER, lysosomes, and mitochondria serve other important functions within the cell, they are not primarily responsible for lipid synthesis or drug detoxification. The rough ER focuses on synthesizing proteins, lysosomes are involved in the breakdown of waste materials and cellular debris, and mitochondria are the powerhouses of the cell, generating ATP through cellular respiration.

2. What term describes a substance that alters the rate of a chemical reaction without being consumed or permanently changed?

A. Catalyst

B. Reactant

C. Inhibitor

D. Enzyme

A catalyst is a substance that increases or decreases the rate of a chemical reaction without undergoing any permanent change itself. This means that it facilitates the reaction by providing an alternative pathway with a lower activation energy, allowing the reactants to convert into products more efficiently. Importantly, since a catalyst is not consumed in the reaction, it can be used repeatedly. In contrast, a reactant is a substance that undergoes a change during the reaction, meaning it is consumed in the process. An inhibitor slows down the reaction rate but is not a substance that facilitates or speeds up the reaction. Enzymes are biological catalysts that perform the same function as a general catalyst, but they are specific to biological processes. While enzymes are a type of catalyst, the broader term that encompasses all such substances is catalyst. Therefore, identifying a catalyst as the correct answer accurately captures the essence of the term described in the question.

3. Which of the following substances is a common biological catalyst?

A. DNA

B. Protein

C. Water

D. Salt

A common biological catalyst is an enzyme, which is primarily composed of proteins. Enzymes facilitate biochemical reactions by lowering the activation energy required for the reaction to occur, thereby increasing the reaction rate without being consumed in the process. This catalytic property is fundamental to various biological functions, including digestion, metabolism, and DNA replication. While DNA plays a crucial role in the storage and transmission of genetic information, it does not act as a catalyst in biological reactions. Water, although vital for life and participating in many biochemical reactions, does not serve as a catalyst itself. Salt, made up of ions, can influence reactions through osmosis or ionic strength but does not catalyze reactions in the way proteins do. Therefore, proteins, specifically enzymes, are recognized for their catalytic abilities in biological systems.

4. What is a phenotype?

A. The genetic constitution of an organism

B. The observable characteristics of an organism

C. The location of genes on a chromosome

D. The evolutionary history of a species

A phenotype refers to the observable characteristics of an organism, which can include traits such as physical appearance, development, behavior, and biochemical properties. These traits result from the interaction of the organism's genotype, which is the genetic makeup, and environmental factors. For example, the phenotype of a plant may include features such as height, leaf shape, and flower color, which are directly visible and can be measured or assessed. Understanding phenotypes is crucial in fields like genetics, biology, and ecology, as they help in studying how organisms adapt to their environment or how traits are inherited across generations. The other choices focus on genetic information, gene location, and evolutionary history, which do not directly pertain to the observable traits that define a phenotype.

5. What is the primary function of peroxisomes in a cell?

A. Protein synthesis

B. Lipid metabolism

C. Detoxification of harmful chemicals

D. Energy production

Peroxisomes play a crucial role in the detoxification of harmful chemicals in a cell. These organelles contain a variety of enzymes that are involved in breaking down fatty acids and amino acids, as well as in the metabolism of reactive oxygen species. One of the key functions of peroxisomes is to convert hydrogen peroxide, a toxic byproduct of various metabolic reactions, into water and oxygen using the enzyme catalase. This process protects the cell from oxidative damage and helps maintain cellular health. While peroxisomes are involved in lipid metabolism and certain levels of energy production (through the breakdown of fatty acids), their most prominent and distinguishing function is the detoxification of harmful substances, making them essential for cellular homeostasis and overall metabolic health.

6. What are the two main types of cells?

A. Prokaryotic and eukaryotic

B. Animal and plant

C. Multicellular and unicellular

D. Haploid and diploid

The two main types of cells are prokaryotic and eukaryotic. Prokaryotic cells are generally simpler and smaller, lacking a defined nucleus and membrane-bound organelles; they include bacteria and archaea. In contrast, eukaryotic cells are more complex, have a defined nucleus, and contain various membrane-bound organelles, which are characteristic of plants, animals, fungi, and protists. Understanding this distinction is fundamental in biology, as it lays the groundwork for more complex concepts, including cellular processes, organism classification, and evolutionary biology. The other options represent different classifications or characteristics of cells rather than the primary types. For instance, animal and plant cells are both subsets of eukaryotic cells. Similarly, multicellular and unicellular describe the organization of living organisms rather than the cells themselves, while haploid and diploid are terms related to the number of chromosome sets in a cell.

7. What is primarily contained within peroxisomes in a cell?

A. Ribosomal RNA

B. Oxidase enzymes

C. Protein enzymes

D. Cellular debris

Peroxisomes are specialized organelles within cells that play a crucial role in various metabolic processes, particularly in the breakdown of fatty acids and the detoxification of harmful substances. The primary function of peroxisomes involves the presence of oxidase enzymes, which facilitate the oxidation of fatty acids. These enzymes also contribute to the production of hydrogen peroxide, a byproduct that is subsequently broken down by catalase, another enzyme found within the peroxisome. This dynamic makes peroxisomes essential for maintaining cellular health by metabolizing long-chain fatty acids and neutralizing toxic compounds. In contrast, ribosomal RNA is mainly found in ribosomes and is essential for protein synthesis, while protein enzymes can be found throughout various organelles and cellular compartments, but are not specific to peroxisomes. Cellular debris refers to waste products and aged cellular components that can be found in various parts of the cell but does not represent a primary function or component of peroxisomes. Thus, the presence of oxidase enzymes defines the significant role of peroxisomes in the cell.

8. What are mitochondria commonly referred to as?

A. Cell builders

B. Powerhouses of the cell

C. Transporters of nutrients

D. Storage sacs

Mitochondria are commonly referred to as the "powerhouses of the cell" because they play a crucial role in energy production. They are the sites of cellular respiration, a process where nutrients from food are converted into adenosine triphosphate (ATP), the primary energy carrier in cells. The inner membrane of mitochondria hosts proteins and enzyme complexes that facilitate the electron transport chain, leading to the generation of ATP. By producing this essential energy source, mitochondria enable cells to perform various functions, including growth, division, and response to environmental changes, maintaining overall cellular health and metabolism. This title aptly reflects their fundamental role in supplying energy that is vital for the survival of both the cell and the organism as a whole.

9. What is another name for a coordinate covalent bond?

A. Double bond

B. Single bond

C. Dative bond

D. Triple bond

A coordinate covalent bond, also known as a dative bond, occurs when one atom donates both of the electrons shared in a covalent bond. This is different from typical covalent bonds, where each atom contributes one electron. The nomenclature reflects the nature of the bond – "dative" denotes that the bond is formed by the donation of a lone pair of electrons from one atom to another that lacks a sufficient number of electrons to reach a stable electronic configuration. This concept is crucial in understanding the formation of complex molecules, particularly in coordination chemistry, where ligands (molecules or ions that donate electron pairs) bond to a central metal atom. The terms double bond, single bond, and triple bond refer to the number of shared electron pairs between two atoms, differing fundamentally from the concept of a coordinate covalent bond.

10. What combines NAD+ with pyruvate to form NADH and acetyl coenzyme A?

A. Glycolysis

B. Transition stage

C. Kreb cycle

D. Electron transport cycle

The transition stage, also known as the link reaction or pyruvate dehydrogenase complex, is the process that connects glycolysis to the Krebs cycle. During this stage, pyruvate generated from glycolysis is converted into acetyl coenzyme A (acetyl-CoA) and carbon dioxide. In this reaction, NAD+ is reduced to NADH as it accepts electrons. This is a crucial step because NADH plays a significant role in the cellular respiration process, as it carries high-energy electrons to the electron transport chain, ultimately contributing to ATP production. Acetyl-CoA then enters the Krebs cycle, where it is further oxidized for energy extraction. Although glycolysis does produce NADH, it does not combine NAD+ with pyruvate; rather, it breaks down glucose into two molecules of pyruvate, along with producing a small amount of NADH. The Krebs cycle operates on acetyl-CoA but does not start with pyruvate. The electron transport chain is responsible for the final steps of energy production using NADH and FADH2 but does not involve the combination of NAD+ with pyruvate. Thus, the transition stage is specifically responsible for combining NAD+ with pyruvate to produce NAD