Advanced Biochemistry Challenge

Biochemistry · Answer Key · 15 Questions

1. Which specific amino acid is essential for forming disulfide bridges that stabilize the tertiary structure of proteins?

A) Glycine
B) Cysteine
C) Alanine
D) Proline

2. In the process of glycolysis, which enzyme catalyzes the irreversible phosphorylation of fructose-6-phosphate?

A) Hexokinase
B) Phosphofructokinase-1
C) Pyruvate kinase
D) Aldolase

3. What is the primary function of the coenzyme Nicotinamide Adenine Dinucleotide (NAD+) during cellular respiration?

A) Electron carrier
B) ATP synthesis
C) Oxygen transport
D) Carbon fixation

4. Which nitrogenous base is found exclusively in RNA and pairs with adenine during transcription?

A) Thymine
B) Cytosine
C) Uracil
D) Guanine

5. The alpha-helix and beta-pleated sheet structures represent which level of protein organization?

A) Primary
B) Secondary
C) Tertiary
D) Quaternary

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6. Which organelle is the primary site for the beta-oxidation of long-chain fatty acids?

A) Lysosome
B) Mitochondrion
C) Golgi apparatus
D) Smooth endoplasmic reticulum

7. What is the prosthetic group required for the function of hemoglobin in binding oxygen?

A) Magnesium ion
B) Heme group
C) Zinc finger
D) Copper ion

8. Which term describes the site on an enzyme where the substrate binds and catalysis occurs?

A) Allosteric site
B) Active site
C) Regulatory domain
D) Cofactor binding pocket

9. During DNA replication, which enzyme is responsible for synthesizing short RNA primers to initiate strand synthesis?

A) DNA polymerase III
B) Helicase
C) Primase
D) Ligase

10. Which carbohydrate is a polysaccharide used for glucose storage in the liver and muscles of humans?

A) Amylose
B) Cellulose
C) Glycogen
D) Chitin

11. What is the net gain of ATP molecules directly produced from one molecule of glucose during glycolysis?

A) 1
B) 2
C) 4
D) 36

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12. The 'fluid mosaic model' describes the structural composition of which cellular component?

A) Nuclear envelope
B) Cell wall
C) Plasma membrane
D) Mitochondrial matrix

13. Which chemical bond links monosaccharides together to form disaccharides and polysaccharides?

A) Peptide bond
B) Glycosidic bond
C) Ester bond
D) Hydrogen bond

14. What is the result of a competitive inhibitor binding to an enzyme's active site?

A) The Vmax remains unchanged
B) The Km increases
C) The enzyme is denatured
D) The reaction is permanently stopped

15. Which vitamin acts as a crucial cofactor in the carboxylation reactions of the blood-clotting cascade?

A) Vitamin A
B) Vitamin C
C) Vitamin D
D) Vitamin K

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