

2009 年全国硕士研究生入学考试 自命题科目试题册

业务课代码: 706

业务课名称: 普通生物化学

考生须知: 1、答案必须写在答题纸上, 写在其它纸上无效。

2、答题时必须使用蓝、黑色墨水笔或圆珠笔作答, 用其他笔答题不给分。不得使用涂改液。

一、名词解释题 (每个 2 分, 共 30 分)

- | | | |
|-----------------------------------|--|-----------------------|
| 1. Eukaryote | 2. Primary structure of protein | 3. Fluid mosaic model |
| 4. Gel filtration chromatography | ⑤ Proteolytic activation ^{作用} | 6. Exon |
| ⑦ Endocytosis | 8. Genetic code | 9. Cori cycle |
| ⑩ Uncoupler | 11. Nucleosome | 12. Glycolysis |
| 13. Semi-conservative replication | 14. Transamination | 15. Photosynthesis |

二、判断题 (下列各题, 你认为正确的, 请在答题纸上打“√”, 错的打“×”。每个 1 分, 共 10 分)

1. DNA consists of four kind of bases joined to a sugar-phosphate backbone. 3.5-5p ✓
2. Allosteric enzymes do not obey Michaelis-Menten kinetics.
3. NADH and NADPH are major electron carriers in the oxidation of fuel molecules.
4. Protein synthesis in bacteria is initiated by formylmethionyl transfer RNA.
5. Gluconeogenesis is a reversal of glycolysis. false
6. Specific antibodies are synthesized following exposure to an antigen. 抗原
7. Intermediates in fatty acid synthesis are attached to an acyl carrier protein (ACP).
- ⑧ Lipid bilayers are highly permeable to ions and most polar molecules. 合成
9. Facilitated diffusion ^{易化} of a molecule across a biological membrane is dependent on specific integral proteins and belongs to active transport.
- ⑩ Tertiary structure in a protein refers to the three-dimensional arrangement of all the amino acids in the polypeptide chain. 碱基

三、填空题 (每个 1 分, 共 30 分)

1. Proteins are built from a repertoire of 20 amino acids. Amino acids are linked by () to form polypeptide chain.
2. Enzymes accelerate reactions by stabilizing () but not alter (). 降低

3. Membrane lipids are () molecules containing hydrophilic and hydrophobic moiety.
4. Oxidative phosphorylation in eukaryotes occurs in () .
5. Signal recognition particle (SRP) detects () and bring ribosomes to the ER membrane.
6. Transcription is initiated at () on the DNA template.
7. Protein synthesis is terminated by the release factor that read () .
8. The () pathway of tropical plants accelerates photosynthesis by concentrating CO_2 .
9. The enzyme that catalyzes the first step in a biosynthetic pathway is usually inhibited by the ultimate procedure. The kind of regulation is called () inhibition.
10. In the DNA replication process, the () strand is made in fragments, and the other strand is synthesized continuously, termed () strand.
11. Excess ammonia leads to the formation of () and () , which results in the depletion of α -ketoglutarate.
12. The nucleus stores the cell's genetic information as DNA in (). The nucleolus within the nucleus is the site of () synthesis.
13. An ultracentrifuge is used to sediment the organelles to an equilibrium position in the gradient where their () is equal to that of the sucrose.
14. The pK of an acid is the pH at which it is () dissociated. The Henderson-hasselbach equation expresses the relationship between pH, pK and the ratio of ($\frac{p^2}{p}$), and can be used to calculate values.
15. Protein can be separated from small molecules by () through a semi-permeable membrane which has () that allow small molecules to pass through but not protein.
16. Enzymes are catalysts that increase the () of a chemical reaction without being changed themselves. Virtually all enzymes are (), although some catalytically active RNAs have been identified.
17. A preparation of antibody molecules that arises from several different clones of cells is called a (). It is a () of antibody molecules that bind to different parts of the antigen and with different binding affinities.
18. Cell-surface receptors are () proteins located in the () that bind the hormone (ligand) with high affinity and specificity.

19. In DNA the nucleotides are covalently joined together by () bonds to form a repetitive sugar-phosphate chain which is the backbone to which the () are attached.

20. An open reading frame (ORF) is a run of codons that starts with () and ends with a termination codon, TGA, TAA or TAG.

四、简答题 (共 80 分)

1. 简述糖的生物学作用。(10 分)
2. 生物氧化有哪些特点? (10 分)
3. 试说明动物体内糖代谢与脂肪代谢的相互关系。(8 分)
4. 什么叫无效循环? 细胞如何避免无效循环? 举例说明。(6 分)
5. 简要说明 pH 影响酶促反应速度的机制。(6 分)
6. 动物的肌肉组织可以利用两种不同的途径消除脱氨基作用产生的过量氨。这两种途径分别是什么? 为什么这两种机制是必需的? (10 分)
7. 试述遗传密码的特性。(6 分)
8. 试述下列因素如何影响 DNA 的复性过程? (8 分)

(1) 阳离子的存在, (2) 低于 T_m 的温度, (3) 高浓度的 DNA 链, (4) 重复序列。

9. mRNA、tRNA、rRNA 在蛋白质生物合成中各具什么作用? (6 分)

10. 有一单顺反子细菌 mRNA 的开放阅读框含有 723 个碱基。请回答: (10 分)

(1) 该 mRNA 最初翻译的产物含有多少个氨基酸残基?

(2) 计算该蛋白质产物的合成需要消耗多少分子的 ATP 和 GTP?

(需写出计算过程)

Handwritten calculations for question 10:

$$\begin{array}{r} 24 \\ 3 \overline{) 720} \\ \underline{6} \\ 12 \\ \underline{12} \\ 0 \end{array}$$
 24
 2个ATP
 1GTP
 2ATP
 1GTP

Handwritten calculation:

$$\begin{array}{r} 238 \\ 134 \\ \hline 952 \end{array}$$

Handwritten calculations:

$$\begin{array}{r} 3.3 \quad 906 \\ 7.3 \\ \hline 301 \end{array}$$