

(一) 解釋名詞 (每小題4分，共16分)

1. Zwitterions
2. Cofactor and coenzyme
3. 2-D gel electrophoresis
4. Feedback inhibition

(二) 請舉出三種RNA postsynthetic processing的機制。(9%)

(三) The following reagents are often used in protein chemistry. Match the reagent with the purpose for which it is best suited. Some answers may be used more than once or not at all; more than one reagent may be suitable for a given purpose. (每小題3分，共15分)

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| 1. Hydrolysis of peptide bonds on the carboxyl side of Lys and Arg | (a) CNBr (cyanogen bromide) |
| 2. Cleavage of peptide bonds on the carboxyl side of Met | (b) Edman reagent |
| 3. Breakage of disulfide (—S—S—) bonds | (c) FDNB |
| 4. Determination of the amino acid sequence of a peptide | (d) dithiothreitol |
| 5. Determining the amino-terminal amino acid in a polypeptide | (e) performic acid |
| | (f) chymotrypsin |
| | (g) trypsin |

(四) 有 A, B, C, D, E 五段 peptides，其序列如下：A (Tyr-Lys-Met); B (Gly-Pro-Arg); C (Asp-Trp-Tyr); D (Asp-His-Glu); E (Leu-Val-Phe)

請回答下列問題：(每小題3分，共15分)

- (1) which is most negatively charged at pH 7?
- (2) will yield DNP-tyrosine when reacted with 1-fluoro-2,4-dinitrobenzene and hydrolyzed in acid?
- (3) contains the largest number of nonpolar R groups?
- (4) contains sulfur?
- (5) will have the greatest light absorbance at 280 nm?

(五) Match these molecules with their biological roles. (每小題2分，共12分)

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|---|-------------------|
| (1) extracellular matrix of animal tissues | (a) glycogen |
| (2) carbohydrate storage in plants | (b) starch |
| (3) carbohydrate storage in animal liver | (c) proteoglycan |
| (4) exoskeleton of insects | (d) chitin |
| (5) structural component of bacterial cell wall | (e) cellulose |
| (6) structural component of plant cell walls | (f) peptidoglycan |

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(六) An enzyme catalyzes a reaction at a velocity of 20 $\mu\text{mol/min}$ when the concentration of substrate (S) is 0.01 M. The K_m for this substrate is 1×10^{-5} M. Assuming that Michaelis-Menten

kinetics are followed, what will the reaction velocity be when the concentration of S is (a) 1×10^{-5} M and (b) 1×10^{-6} M? (10分)

(七)在某一個 organism 中，其 peroxidase 的基因有 15,600 個鹼基。此 peroxidase 的分子量大約是 110,000。請問這個 organism 是 prokaryote 或是 eukaryote？請說明你的判斷依據。(amino acid 的平均分子量=110；鹼基的平均分子量=450) (5%)

(八)DNA replication in *E. coli* begins at a site in the DNA called the (a) _____. At the replication fork the (b) _____ strand is synthesized continuously while the (c) _____ strand is synthesized discontinuously. On the strand synthesized discontinuously, the short pieces are called (d) _____ fragments. An RNA primer for each of the fragments is synthesized by an enzyme called (e) _____, and this RNA primer is removed after the fragment is synthesized. The nicks left behind in this process are sealed by the enzyme (f) _____. (每小題3分，共18分)

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