

# 國立中央大學八十八學年度碩士班研究生入學試題卷

所別: 生命科學研究所 不分組 科目: 生物化學 共 2 頁 第 1 頁

## Biochemistry

1. In eucaryotes, what organelles: (6%)
  - a. contain DNA.
  - b. are the sites of energy-yielding reactions.
  - c. are bounded by a double membranes.
2. a. What peptides would be released from the following peptide by treatment with trypsin?  
Ala-Ser-Thr-Lys-Gly-Arg-Ser-Gly-Ala,  
b. If each of the products were treated with fluoro-2, 4-dinitrobenzene (FDNB) and subjected to acid hydrolysis, what DNP-amino acids could be isolated. (8%)
3. For an enzyme that displays Michaelis-Menten kinetics, calculate the reaction velocity,  $v$  (as a percentage of  $V_{max}$ ), observed at (6%)
  - a.  $[S] = K_m$
  - b.  $[S] = 0.5 K_m$
  - c.  $[S] = 2 K_m$
4. Would you expect mRNA or rRNA to be degraded more quickly in the cell? Why? (6%)
5. Compare the properties of the enzymes DNA polymerase I and polymerase III from *E. coli*. (6%)
6. The disease phenylketonuria, which causes severe mental retardation, is characterized by the urinary excretion of phenylpyruvate. Why is this formed? (6%)
7. The sulfonamides are antibacterial agents. How do the sulfonamides work? (6%)
8. Define cloning of DNA. (6%)
9. In the mammalian amino acid metabolism, aspartate is considered as glucogenic, while leucine is ketogenic. Explain the biochemical reasons. (6%)

參考用

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10. Why do almost all enzyme-catalyzed reactions show a pH optimum? (6%)
11. Describe the biosynthesis and biological function of S-adenosyl methionine. (6%)
12. Why should the level of urea cycle enzymes be increased both in the situation of a high intake of proteins and in starvation? (6%)
13. Name the bonds involved in the following: (8%)
- between monosaccharides in polysaccharides
  - between amino acids in proteins
  - between nucleotides in nucleic acids
  - between glycerol and fatty acids in triacylglycerol
14. The disaccharide lactose exists in two anomeric forms, however, no anomeric forms of the disaccharide sucrose have been reported. Why? (6%)
15. The first step in fatty acid synthesis attaches  $\text{CO}_2$  to acetyl CoA, yet if an *in vitro* fatty acid synthesizing system is incubated with  $^{14}\text{CO}_2$ , no radioactivity is found in the fatty acids. Why? (6%)
16. Why is puromycin able to function as an inhibitor of translation in both bacteria and eucaryotes? (6%)

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