

1. In each of the following pairs of amino acids, identify which amino acid would be most soluble in water: (4%)
 - A. Ala, Leu
 - B. Tyr, Phe
 - C. Ser, Ala
 - D. Trp, His
2. A new protein of unknown structure has been purified. Gel filtration chromatography reveals that the native protein has a molecular weight of 240,000. Chromatography in the presence of 6M guanidine hydrochloride yields only a peak for a protein of M_r 60,000. Chromatography in the presence of 6M guanidine hydrochloride and 10 mM β -mercaptoethanol yields peaks for proteins of M_r 34,000 and 26,000. Explain what can be determined about the structure of this protein from these data. (4%)
3. An enzyme is isolated. How do you determine how pure it is? (3%)
4. Electrospray ionization mass spectrometry (ESI-MS) of the polypeptide chain of myoglobin yielded a series of m/z peaks. Two successive peaks had m/z values of 1304.7 and 1413.2, respectively. Calculate the mass of the myoglobin polypeptide chain from these data. (3%)
5. What is the effect of the following changes on the O_2 affinity of myoglobin and hemoglobin? (a) A drop in the pH of blood plasma from 7.4 to 7.2. (b) A decrease in the partial pressure of CO_2 in the lungs from 6 kPa (holding one's breath) to 2 kPa (normal). (c) An increase in the BPG level from 5 mM (normal altitudes) to 8 mM (high altitudes) (6%)
6. Amino acid degradation involves mainly catabolism of ammonium nitrogen and carbon skeleton. Please describe these two pathways. (20%)
7. Please describe potential cellular location of cholesterol, cholesteryl ester, phospholipids and triacylglycerol. (8%)
8. What are the functions of Apo-AI, Apo-C-II and ApoE in lipoprotein metabolism? (6%)
9. If adipose tissues are all removed from a rat, what changes may happen in lipid metabolism in this rat? (6%)
10. Please list two reactions in glycolysis that can generate ATP and what enzymes participate in these two reactions. (4%)
11. What is the Warburg effect in glucose metabolism? And what are the main products after an acetyl-CoA goes through citric acid cycle? (6%)
12. How insulin and glucagon modulate the concentrations of cyclic AMP in liver cells? (4%)
13. How hydroxylation plays an important role in collagen function? What disease will happen if there is no hydroxylation modification on collagens? (6%)
14. Enzymes are catalytic biological polymers. What are enzymes made of? (4%) (註：“made of”意指“由...所構成”)

見背面

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國立臺灣大學 102 學年度碩士班招生考試試題

科目：生化學一

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15. Explain why V_o is equal to $0.5V_{max}$ when $[S]$ is equal to K_m (4%).
16. International Union of Biochemists (IUB) suggests that enzymes can be grouped into six distinct classes. Among them, the reactions catalyzed by the transferases play crucial roles in signal transduction pathways. Please write down two types of transferase-catalyzed reactions. (4%)
17. How do enzymes reduce activation energy of chemical reactions? (8%) (Note: You must provide at least four distinct molecular bases to get full points.)

試題隨卷繳回

