

臺灣綜合大學系統 107 學年度學士班轉學生聯合招生考試試題

科目名稱	生物化學	類組代碼	C07
		科目碼	C0701

※本項考試依簡章規定各考科均「不可以」使用計算機

本科試題共計 4 頁

A. Multiple Choices (50%, 2% each; one correct answer only, 共 25 題)

- The number of isomers of **glucose** is
A) 2 B) 4 C) 8 D) 16
- In β -pleated sheet structures
A) neighboring chains lie in a flat plane
B) neighboring residues are hydrogen bonded
C) neighboring chains are connected by α -helices
D) neighboring chains are hydrogen bonded
- Proteins must fold into their final structures to be functional. Which of the following statements are **not true**?
A) Protein tertiary structure is determined by the primary sequence.
B) Hydrophobic amino acids are buried in the interior.
C) Structural motifs such as $\alpha\alpha$ or $\beta\beta$ act as seeds around which the rest of the protein folds.
D) Helper proteins called chaperones may assist protein folding.
E) Folding begins with disulfide bond formation.
- The fact that allosteric enzymes are remarkably sensitive to control makes them ideal candidates for:
A) The initial steps in a pathway B) The rate-limiting steps in a pathway
C) The final steps in a pathway D) All the steps in a pathway
E) Alternative pathways
- Molecular chaperones bind to unfolded or partially folded polypeptide chains in order to accomplish which of the following?
A) ensure that improper aggregation of hydrophobic segments does not occur
B) engulf the protein in order to ensure that the protein is not damaged by heat denaturation
C) facilitate native folding by exposing hydrophobic segments of the protein as it is synthesized
D) facilitate aggregation of multiple subunits of a protein during synthesis
E) All of the above are accomplished by molecular chaperones.
- The chirality of an amino acid results from the fact that its α -carbon:
A) is a carboxylic acid. B) is bonded to four different chemical groups.
C) is symmetric. D) is in the L absolute configuration in naturally occurring proteins.
E) has no net charge.
- The value of n , the Hill constant (coefficient), for hemoglobin is about _____ as great as the value for myoglobin.
A) half B) twice C) three times D) five times E) ten times
- Which of the following amino acids combinations have side chains with groups that have the greatest ability to stabilize the tertiary structure of a protein?
A) Lys and Arg B) Cys and Glu C) Glu and Lys
D) Gln and Glu E) Pro and Asp

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<p>9. In the Beer-Lambert equation, $A = \epsilon bc$, what quantity is represented by "ϵ"?</p> <p>A) Absorptivity B) Molar absorptivity C) Path length D) None of these</p> <p>10. Sucrose consists of</p> <p>A) Glucose + glucose B) Glucose + fructose C) Glucose + galactose D) Glucose + mannose</p> <p>11. Which of the following segments of the integral membrane protein glycophorin most likely contains the membrane-spanning sequence?</p> <p>A) LSTTEVAMHTTTSSSVSKSY B) SQTNDTHKRDTYAATPRA C) VSEISVRTVYPPEEETGE D) ITLIIFGVMAGVIGTILLI E) YGIRRLIKKSPSDVKPLP.</p> <p>12. The cleavage specificity of trypsin and chymotrypsin depend in part on the</p> <p>A) proximity of Ser 195 to the active site or specificity pocket B) size, shape, and charge of the active site or specificity pocket C) presence of a low-barrier hydrogen bond in the active site or specificity pocket D) absence of water in the active site.</p> <p>13. The first step in the zymogen activation of chymotrypsinogen is</p> <p>A) binding of trypsinogen activator B) cleavage by trypsin C) folding into the native structure D) self-digestion by chymotrypsin</p> <p>14. Movement of ions across a cell membrane by the Na/K ATPase is best described as</p> <p>A) sodium moved outside to inside, potassium inside to outside B) sodium moved inside to outside, potassium outside to inside C) sodium moved inside to outside, potassium inside to outside D) sodium moved outside to inside, potassium outside to inside E) none of the above</p> <p>15. The peptide bond in proteins is</p> <p>A) planar, but rotates to three preferred dihedral angles B) nonpolar, but rotates to three preferred dihedral angles C) nonpolar, and fixed in a trans conformation D) planar, and usually found in a trans conformation</p> <p>16. Which of the statements regarding enzymes is false?</p> <p>A) Enzymes are proteins that function as catalysts. B) Enzymes are specific. C) Enzymes provide activation energy for reactions. D) Enzyme activity can be regulated. E) Enzymes may be used many times for a specific reaction</p> <p>17. Which of the following is TRUE regarding cofactors?</p> <p>A) Coenzymes are often separate from the enzyme and do not need recharged. B) Metal ions must be covalently attached to function as a cofactor. C) Cofactor is a broad term used for all enzyme "helpers". D) Prosthetic groups can dissociate readily and be regenerated for use in another enzyme. E) An apoenzyme implies that a cofactor is present.</p>			

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18. Which of the following compounds would cross a biological membrane most readily by nonmediated diffusion?

- A) water B) acetone C) hexane D) acetic acid E) methanol

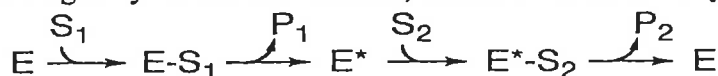
19. The quaternary structure of human hemoglobin is best described as a

- A) dimer of two myoglobin dimers. B) tetramer of identical subunits.
C) tetramer of four different subunits. D) tetramer of two different subunits.

20. The steady state assumption in enzyme kinetics:

- A) insures that the product of an enzymatic reaction will always be formed
B) explains why enzymes are effective catalysts
C) states that the formation of ES is equal to its breakdown
D) is based upon the fact that the maximum velocity of an enzyme is very high
E) none of the above

21. In the following enzyme reaction scheme, what sort of multi-enzyme kinetics are shown?

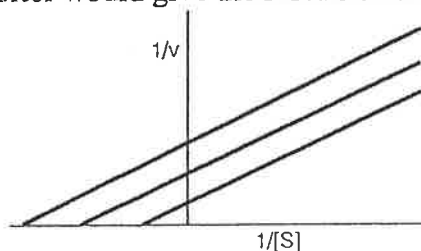


- A) ordered substrate binding with random product release
B) ordered substrate binding with ordered product release
C) random substrate binding with ordered product release
D) random substrate binding with random product release
E) ping-pong mechanism

22. A peptide was found to have a molecular mass of about 650 and upon hydrolysis produced Ala, Cys, Lys, Phe, and Val in a 1:1:1:1:1 ratio. The peptide upon treatment with Sanger's reagent produced DNP-Cys and exposure to carboxypeptidase produced valine. Chymotrypsin treatment of the peptide produced a dipeptide that contained sulfur and has a UV absorbance, and a tripeptide. Exposure of the peptide to trypsin produced a dipeptide and a tripeptide. Deduce the sequence of the peptide.

- A) Val-Ala-Lys-Phe-Cys B) Cys-Lys-Phe-Ala-Val
C) Cys-Ala-Lys-Phe-Val D) Cys-Phe-Lys-Ala-Val
E) Val-Phe-Lys-Ala-Cys

23. What type of inhibitor would give the results seen in the following plot?



- A) competitive inhibitor
B) mixed inhibitor
C) noncompetitive inhibitor
D) uncompetitive inhibitor
E) none of the above

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<p>24. The two amino acids most often found in a polyproline II helix are proline and _____.</p> <p>A) alanine B) glycine C) serine D) lysine E) histidine</p> <p>25. What happens when the GTPase activity of a G protein is blocked?</p> <p>A) the α subunit associates only with the β subunit, not the γ subunit</p> <p>B) GTP cyclizes to cGMP</p> <p>C) binding to GAP occurs with very high affinity</p> <p>D) adenylate cyclase remains active</p> <p>E) none of the above</p> <p>B. Essays (50%, 共 9 題)</p> <p>1. List five coenzymes that are required for the oxidative decarboxylation of pyruvate and α-ketoglutarate. (5%)</p> <p>2. List three reactions that are regulated in glycolysis. (5%)</p> <p>3. Describe the role of fructose 2,6-bisphosphate in regulation of glycolysis and gluconeogenesis. (5%)</p> <p>4. Calculate the ATP yield for the complete oxidation of glucose. (5%)</p> <p>5. Describe the peptide bonds hydrolyzed by the following enzymes:</p> <p>(a) trypsin (2%)</p> <p>(b) chymotrypsin (2%)</p> <p>(c) pepsin (2%)</p> <p>6. Ketone bodies will be built up in the fasting mice. Why? (6%)</p> <p>7. Give the reactions that produce CO_2 or FADH_2 in the citric acid cycle. (6%)</p> <p>8. List the reaction equation catalyzed by the following enzymes:</p> <p>(a) glutamate dehydrogenase (2%)</p> <p>(b) glutamine synthetase (2%)</p> <p>(c) glutaminase (2%)</p> <p>9. Use the Michaelis-Menten equation to demonstrate the following:</p> <p>(a) v_0 becomes independent of $[\text{S}]$ when $[\text{S}] \gg K_m$ (2%)</p> <p>(b) The reaction is first order with respect to S when $[\text{S}] \ll K_m$ (2%)</p> <p>(c) $[\text{S}] = K_m$ when v_0 is one-half V_{max} (2%)</p>			