

大葉大學 九十二 學年度 研究所碩士班 招生考試試題紙

系 所 別	組 別	考 試 科 目 (中 文 名 稱)	考 試 日 期	節 次	備 註
生物產業科技學系	乙組	生物化學	4 月 13 日	第 1 節 08:30 ~ 10:00	共 2 頁 P2-1

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

I. Single choice: (2% each)

- Which statement is incorrect for ninhydrin?
 - reacts with an amino acid by oxidatively deaminating its amino group
 - produces a purple colored product upon reaction with alanine
 - produces a yellow colored product upon reaction with histidine
 - can be used to detect the location of amino acids following paper chromatography.
- The main information to define the properties of a protein is in (a) amino acid composition (b) amino acid sequence (c) secondary structure (d) tertiary structure.
- Which interaction does not occur in the tertiary structure of a protein?
 - intermolecular covalent bonds (b) intramolecular hydrogen bonds (c) electrostatic interactions (d) hydrophobic interactions.
- The most logical order of events in sequencing a protein would be
 - Reduce with mercaptoethanol.
 - Sequence using Edman chemistry.
 - Separate by chromatography techniques.
 - Alkylate with iodoacetamide.

(a) A, B, C, D (b) C, A, D, B (c) C, B, A, D (d) A, D, C, B.
- A peptide has amino-acid sequence as
N-Asp-Ala-Gly-Arg-His-Cys-Lys-Trp-Lys-Ser-Glu-Asn-Leu-Ile-Arg-Thr-Tyr-C.
How many fragments will be generated by digestive enzyme trypsin?
 - 4 (b) 5 (c) 6 (d) 7.
- Denaturation of proteins (a) results from the disruption of their primary structure (b) is always reversible (c) is caused by heating or exposure to extremes of pH (d) refers to the cleavage of disulfide bonds by detergents.
- Which one is incorrect for the chemical features of common monosaccharides?
 - exist at least one and often two or more asymmetric centers
 - form polymeric structure via glycosidic bonds
 - form cyclic structure with formation of an additional asymmetric center
 - mostly exist in linear structures in aqueous solution.
- Glycogen is (a) a form of storage polysaccharide in plants (b) a branched polymer of glucose (c) containing more $\alpha(1,6)$ -o-glycosidic bonds than $\alpha(1,4)$ -o-glycosidic bonds (d) also a structural molecules.
- Fatty acids occurring in nature most commonly (a) are not straight chain (b) have double bonds present in trans configuration (c) contain an even number of carbon atoms (d) do not contain more than 16 carbon atoms.
- Which one is the terpene-based lipid? (a) glycerophospholipids (b) waxes (c) sphingolipids (d) cholesterol.
- A primer (a) is an oligonucleotide (b) must have a free 5'-OH end for the polymerization process (c) is used in protein synthesis (d) none of above.
- How is the radioactivity incorporated into the newly synthesized DNA using the chain termination protocol for sequencing DNA? (a) the dideoxynucleotide is labeled with ^{32}P (b) one of the dNTPs is labeled with ^{32}P (c) the primer strand is labeled with ^{32}P (d) the template strand has been labeled beforehand with ^{32}P .
- Which condition will decrease the melting temperature of DNA? (a) higher salt concentration in the buffer (b) higher GC content in the DNA (c) longer DNA fragments (d) higher formamide concentration in the buffer.

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生物產業科技學系	乙組	生物化學	4月13日	第1節	共2頁 P2-2

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14. What statement is incorrect about coenzymes?
 - (a) They can be metal ions such as Zn(II)
 - (b) They are commonly derived from vitamins
 - (c) They bind to the active site on specific enzymes
 - (d) NAD^+ , biotin and FAD are examples of coenzymes.
15. For an enzyme which obeys Michaelis-Menten kinetics, what is the V_{\max} value in $\mu\text{mol}/\text{min}$ if $v = 25 \mu\text{mol}/\text{min}$ when $[\text{S}] = 0.5 K_m$? (a) 25 (b) 50 (c) 75 (d) 100.
16. Which type of enzyme inhibition can be overcome the effects by high substrate concentration?
 - (a) competitive inhibition (b) pure noncompetitive inhibition
 - (c) mixed noncompetitive inhibition (d) irreversible inhibition.
17. The specificity of an enzyme on the substrates occurs through molecular recognition based primarily on
 - (a) size complementarily (b) structural complementarily (c) covalent complementarily (d) atomic complementarily.
18. The final electron acceptor in the electron transport chain is (a) H_2O (b) cytochrome c (c) ubiquinone (d) molecular O_2 .
19. Membrane lipids in a lipid bilayer are held together primarily by
 - (a) hydrogen bonds (b) covalent bonds (c) hydrophobic forces (d) electrostatic forces.
20. The most important source of reducing equivalents for fatty acid synthesis in the liver is
 - (a) the pentose phosphate pathway
 - (b) the tricarboxylic acid cycle
 - (c) the oxidation of pyruvate
 - (d) glycolysis.

II. Explain briefly the following terms: (3% each)

1. allosteric regulation
2. polymerase chain reaction
3. translation
4. malate-aspartate shuttle
5. wobble hypothesis
6. cooperativity
7. Sn RNA

III. Questions:

1. List the reactions of glycolysis that (a) consume ATP and (b) yield ATP. (8%)
2. Describe the effect on the enzymes, isocitrate dehydrogenase and α -ketoglutarate dehydrogenase, in the TCA cycle by the following factors:
 - (a) increasing the concentration of NAD^+ .
 - (b) reducing the concentration of ATP.
 - (c) increasing the concentration of isocitrate. (6%)
3. Please describe the process of the generation of Okazaki fragments in DNA replication. (6%)
4. What are the three types of RNAs and their functions in human? (6%)
5. Compare the chemical reactions catalyzed by lyases and ligases. (6%)
6. How are the odd-carbon fatty acids metabolized in human? (7%)