

考生注意事項：所有考題務必在答案卷上作答。

一、選擇題(均為單選，每題2分，答錯倒扣0.5分)

1. Which of the following is not a phospholipid?
    - A. Cerebroside
    - B. Plasmalogen
    - C. Sphingomyelin
    - D. Cephalin
    - E. Lecithin
  2. Sucrose
    - A. can undergo mutarotation.
    - B. is not a reducing sugar because carbon 1 of the fructose residue forms a glycoside with glucose.
    - C. is a reducing sugar because carbon 1 of the glucose residue is free.
    - D. contains glucose and galactose.
    - E. none of above.
- For questions 3 to 5
- A.  $\alpha$ -helix
  - B.  $\beta$ -pleated sheet
  - C. random coil
  - D. all of above
  - E. both A and B
3. is produced by procedures that denature proteins.
  4. is formed by hydrogen bonding between the peptide bonds on adjacent chains.
  5. has its  $\phi$  and  $\psi$  angles located in the allowed regions on Ramachandran diagram.
  6. When protein subunits combine to form a quaternary structure, all of the following interactions may arise except
    - A. peptide bond formation.
    - B. hydrophobic interaction.
    - C. electrostatic bonding.
    - D. van der Waals forces.
    - E. hydrogen bonding.
  7. Which of the following has quaternary structure?
    - A. Insulin
    - B. Myoglobin
    - C. Hemoglobin
    - D. Cytochrome C
    - E. None of the above
  8. Human adult hemoglobin(HbA)
    - A. carries one O<sub>2</sub> for each hemoglobin molecule.
    - B. binds four molecules of 2,3-bisphosphoglycerate when present as deoxyhemoglobin.
    - C. binds one molecules of 2,3-bisphosphoglycerate when present as deoxyhemoglobin.
    - D. binds one molecule of 2,3-bisphosphoglycerate when present as oxyhemoglobin.
    - E. exhibits a switch from a weak binding state to a strong binding state as depicted by Hill plots.

For questions 9 to 13

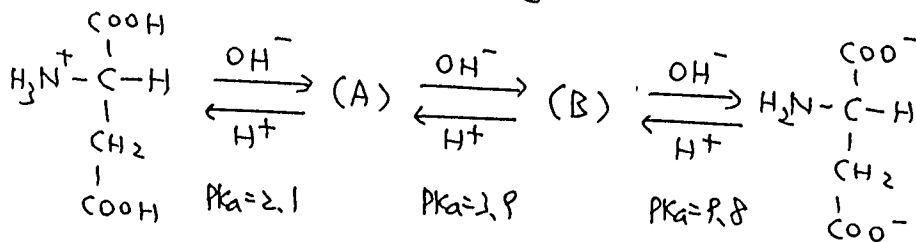
- A. primary structure of proteins
  - B. secondary structure of proteins
  - C. tertiary structure of proteins
  - D. quaternary structure of proteins
  - E. all of the above
9. Requires the presence of more than one polypeptide chain.
10. Results from the formation of hydrogen bonds between the -NH- and -CO- groups of the peptide bonds.
11. Is produced by the interaction of side chains of the amino acids.
12. Is ultimately dependent upon the sequence of amino acids in the protein.
13. Can refer to the  $\alpha$ -helical and  $\beta$ -sheet structures of the protein.

For questions 14 to 17

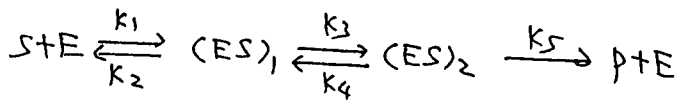
- A. Iodoacetate
  - B. Dansyl chloride
  - C. Performic acid
  - D. Sodium dodecyl sulfate
  - E. Phenylisothiocyanate
14. Reacts with the sulfhydryl groups of cysteine residues in proteins to form the carboxymethyl derivatives.
15. Can be used for sequential degradation of polypeptides.
16. Oxidizes disulfide bonds in proteins.
17. Is a detergent that is used during gel electrophoresis to estimate the molecular weight of proteins.
18. Which of the following statement about the Watson-Crick structure of B-DNA is incorrect?
- A. The "ideal" B-DNA helix has 10 base pair per turn.
  - B. The plane of the bases are nearly perpendicular to the helical axis.
  - C. The strands of the double helix are parallel.
  - D. In the helix, there are two quite different grooves, called the major and minor grooves.
  - E. B-DNA form a right-handed helix.
19. What region is common to most prokaryotic promoters?
- A. TATA box
  - B. CAAT box
  - C. Pribnow box
  - D. Homeo box
  - E. High G-C content
20. Which of the DNA molecules has the highest  $T_M$ (mid-point temperature)? In each case only one of the complementary strand is given.
- A. AATTGGCTGCGAAA
  - B. TTATCGTTACCGTT
  - C. AGGGCTAAGCGGCT
  - D. TTAAGCAAACCGGA
  - E. AAAATTTTTGGGGT

二. 簡答題 (每題3分, 第31, 32題除外)

21. 何謂 Svedberg number (S)?
22. 寫出 Guanine 及 Thymine 之化學結構。
23. 寫出單股 DNA 之化學結構 (鹼基以 Base 1, Base 2, Base 3, Base 4 表示即可), 並註明方向。
24. Aspartic acid 之解離狀態可用下式表示:



- (a) 將 A 及 B 之離子型式表示。
- (b) 求 Aspartic acid 之 isoelectric point。
25. 何謂 optical rotatory dispersion (ORD) 及 circular dichroism (CD)。
26. 寫出由 DNA 生成 poly peptide 之兩個主要程序。
27. 由 wild-type gene 發生突變之主要類型。
28. 寫出 amber 及 ochre codon。
29. 寫出 1 分子 glucose 經 EMP pathway 生成 pyruvate 之總括反應式。
30. 何謂 HMP pathway。
31. (15%) 以 equilibrium approach 及 quasi-steady-state 求下列西李素反應速率式:



32. (15%) 吾人想利用 E. coli 之 host-vector 系統生產人骨豐之 r-interferon; 請以流程图扼要表示重組 plasmid 之製造過程。