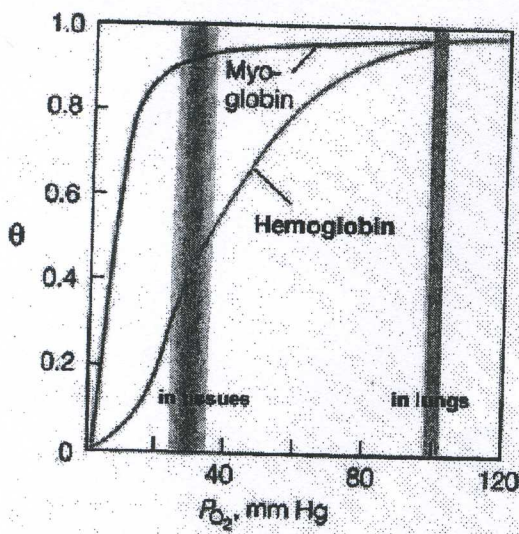


慈濟大學 96 學年度  
研究所碩士班招生考試命題紙

科目：生物化學

共3頁

1. Among the 20 amino acids normally found in proteins, there are four of them containing **charged R (functional) groups** at **pH7**. Please give the **full names, three letter abbreviations, and one letter symbols** of these amino acids. (4 points)
2. Please indicate the major **non-covalent interactions** responsible for the folding of proteins. (4 points)
3. After the metabolisms, in what compounds is the **Nitrogen** from the following biomolecules excreted out of the **human body**? (3 points)
  - (a). Amino Acids
  - (b). Purines
  - (c). Pyrimidines
4. The graph below shows the relationship between the environmental  $P_{O_2}$  and the  $O_2$  saturation ( $\theta$ ) of **Hemoglobin** and **Myoglobin**. Please give a **simple explanation to this graph** and point out the **physiological importance** of the two difference curves in the graph. (8 points)





慈濟大學 96 學年度  
研究所碩士班招生考試命題紙

科目：生物化學

共3頁

5. An enzymatic reaction was found to be affected by "inhibitor A", the following data were collected at fixed total enzyme concentration:

[S] (mM)	$v_0$ ( $\mu\text{M}/\text{min}$ ) (original, uninhibited)	$v_0$ ( $\mu\text{M}/\text{min}$ ) (inhibitor added)
2.5	28.0	21.0
4.0	40.0	30.0
10.0	70.0	52.5
20.0	95.0	71.3
40.0	112.0	84.0
100.0	128.0	96.0
1000.0	139.0	104.5
2000.0	140.0	105.0

\* [S]: substrate concentration;  $v_0$ : initial rate of enzyme catalytic reaction.

\* original: enzyme reaction free of inhibitor.

\* inhibitor added: enzyme reaction with 1mM "inhibitor A" added.

- (a) Please plot the **Michaelis-Menton** curves of these two experiments (original and inhibited, two curves in one same graph). (4 points)
- (b) What were the  $V_{\max}$  and  $K_M$  for the enzyme **without** inhibitor added in (original)? (4 points)
- (c) What were the  $V_{\max}$  and  $K_M$  for the enzyme **with** inhibitor added in? (4 points)
- (d) **What kind of inhibition** did the "inhibitor A" perform? (2 points)
6. Suppose that a genetic disorder decreases the sensitivity of fructose 1,6-bisphosphatase to regulation by fructose 2,6-bisphosphate in liver, what are the likely consequences in glucose oxidation in this person? (12 points)
7. A patient with Type 1 (insulin dependent) diabetes was treated with insulin when she was in diabetic ketoacidosis. Please explain the biochemical mechanisms (12 points)
8. Molecules can be transported across biological membranes by A) simple diffusion; B) facilitated diffusion; or C) secondary active transport. What determine(s) the rate of transport in each case? (10 points)



慈濟大學 96 學年度  
研究所碩士班招生考試命題紙

科目：生物化學

共3頁

- 
9. Under what conditions or molecular events, the single-stranded (ssDNA), double-stranded DNA (dsDNA), triple-stranded DNA (H-DNA), and tetraplex DNA (such as G-Quadruplex) can be found in the cells? What are their biological roles in the cells? (9 points)
  10. From the structure and function points, what are the similarities and differences among recombinase, integrase, and transposase? (8 points)
  11. Please describe the methods for purification of miRNA and siRNA from the cells and how to demonstrate these so purified miRNA and siRNA have no other RNA contamination. (8 points)
  12. Please design experiments to analyze and distinguish 3 activities possessed in reverse transcriptase? (8 points)