

I. 單選題 (每題 2 分)

1. The equilibrium constant for the ionization of acetic acid, $\text{CH}_3\text{COOH} \leftrightarrow \text{CH}_3\text{COO}^- + \text{H}^+$, is 0.00002. What can you conclude about this reaction?
- It is a closed system
 - At equilibrium, the concentration of CH_3COOH is much higher than the concentrations of $\text{CH}_3\text{COO}^- + \text{H}^+$
 - It never reaches equilibrium
 - It is spontaneous, starting with CH_3COOH
 - The equilibrium constant increases when the starting concentration of CH_3COOH is increased.
2. In the presence of alcohol dehydrogenase, the rate of reduction of acetaldehyde to ethanol increases as you increase the concentration of acetaldehyde. Eventually the rate of the reaction reaches a maximum, where further increases in the concentration of acetaldehyde have no effect. Why?
- all of the alcohol dehydrogenase molecules are bound to acetaldehyde molecules
 - at high concentrations of acetaldehyde, the activation energy of the reaction decreases
 - the enzyme is no longer specific for acetaldehyde
 - at high concentrations of acetaldehyde, the change in free energy of the reaction decrease
3. The specific energy source for the reaction $\text{ADP} + \text{phosphate} \rightarrow \text{ATP}$ by the enzyme ATP synthetase (CF1 Coupling Factor) in thylakoid membranes is:
- oxidation of water
 - oxidation of NADPH
 - absorption of photons by chloroplast pigments
 - higher concentration of H^+ inside versus outside the thylakoid membranes
4. Which is a common site for attachment of carbohydrates in glycoprotein?
- Thr
 - Ser
 - Gln
 - Asn
 - Tyr

(背面仍有題目,請繼續作答)

5. What type compound is similar to RU486?
- peptide
 - steroid
 - carbohydrate
 - nucleotide
6. What cell in the Pancreas secreted the insulin?
- α cell
 - β cell
 - χ cell
 - δ cell
7. How many ATP consumed that six CO_2 molecules fixed in the Calvin cycle?
- 9
 - 12
 - 15
 - 18
8. What inorganic element is the cofactor for urease?
- Ni^{2+}
 - Fe^{2+}
 - Cu^{2+}
 - Zn^{2+}
9. What are the possible metabolic fates of pyruvate except:
- NADH
 - lactate
 - ethanol
 - acetyl group of acetyl-coenzyme A
10. What are the roles of citric acid cycle in organism except:
- It produces cofactor NADH, FADH_2 and Biotin.
 - It produces intermediates as precursors for other biosynthetic pathways.
 - It produces energy.
 - It occurs in mitochondria only.
 - All reactions are catalyzed by enzymes.
11. Oxidation of fatty acids is tightly regulated. What is the rate-limiting step in fatty acid oxidation and is an important point of regulation:

- A. Fatty acid is catalyzed to fatty acyl-CoA in cytosol.
- B. Fatty acyl-CoA enters into mitochondria matrix.
- C. Rate of β -oxidation of fatty acyl-CoA in mitochondria matrix.
- D. Acetyl-CoA enter into citric acid cycle.
- E. Rate of $FADH_2$ and $NADH$ go through the electron transport chain.

12. What is the common process between oxidative phosphorylation and photophosphorylation:

- A. Both need water as electron donor
- B. Both need oxygen as electron acceptor
- C. Both have identical electron transport chain
- D. Both processes can produce energy
- E. Both process need light to activate the reactions.

13. Which amino acid is not belongs to aromatic R group.

- A. Phenylalanine
- B. Tyrosine
- C. Tryptophan
- D. Lysine

14. How many levels of protein structure.

- A. 1
- B. 2
- C. 3
- D. 4

15. Which substrate could be recognized by Ribozyme.

- A. RNA
- B. DNA
- C. Lipid
- D. Protein

II. 複選題 (每題 2 分)

1. During a heart attack, blood flowing to the heart muscle is interrupted by blockage of a coronary artery. How would you expect the metabolism in the heart to change?

(背面仍有題目,請繼續作答)

- (a) oxidative phosphorylation would slow down in the mitochondria
(b) the rate of production of lactic acid would be stimulated
(c) the production of water by mitochondria would be inhibited
(d) the use of glucose by the muscle tissue would increase
2. Which of the following are weak forces associated with the interaction of biological molecules
(a) hydrogen bonds
(b) electrostatic attractions
(c) covalent bonds
(d) Van der Waals interactions
3. What organelles involved to the conversion of fatty acid to sucrose in germinating seeds?
A. Glyoxysome
B. Mitochondria
C. Chloroplast
D. Cytosol
4. What inorganic element is the cofactor for cytochrome oxidase?
A. Zn^{2+}
B. Cu^{2+}
C. Fe^{2+}
D. Ni^{2+}
5. How the activity of urea cycle is regulated?
A. High protein diet increase urea production
B. High carbohydrate diet increase urea production
C. Prolonged starvation increase urea production
D. Prolonged starvation decrease urea production
E. N-acetylglutamate activate the enzymes in urea cycle
6. What are the correct description regarding hemoglobin :
A. It is a tetrameric protein.
B. 2,3-Bisphosphoglycerate can regulate the binding of oxygen to hemoglobin.
C. Structural change of hemoglobin can affect the binding of oxygen.
D. Sickle-cell anemia is a disease caused by the point mutation of hemoglobin.
E. It is responsible for transporting oxygen only.

7. What are the correct description regarding pyruvate dehydrogenase complex?
- A. It proceeds with three different enzyme reactions in sequential way.
 - B. It require 5 coenzymes such as TPP, FAD, CoA, NAD and lipoate
 - C. The substrate of enzyme reaction are pyruvate and CO_2
 - E. The product of enzyme reaction is lactate
 - F. The product of enzyme reaction is acetyl-CoA
8. Which codon is belongs to termination codon normally signal the end of polypeptide synthesis.
- A. UAA
 - B. UAG
 - B. UGA
 - C. UUU
9. How many codons could code for glycine
- A. 1
 - B. 2
 - C. 3
 - D. 4
10. Which restriction endonuclease is belongs to sticky end enzyme.
- A. *Bam*HI
 - B. *Cl*aI
 - C. *Eco*RI
 - D. *Hae*III

III. 簡答題 (每題 5 分)

1. Branched-chain fatty acids are found in some bacterial membrane lipids. Would their presence increase or decrease the fluidity of the membrane (that is, make them have a lower or higher melting point)? Why?
2. What factors that affect the melting point (T_m) of DNA?

(背面仍有題目,請繼續作答)

3. Which of the following graphs shows the results of reaction rate vs substrate concentration for a non-allosteric enzyme in the absence and presence of a non-competitive inhibitor (non-competitive inhibitors bind to an enzyme at a site different than the active site)? Explain
4. If linking number (Lk) of the supercoil plasmid is 200 and the twice writhe (Wr) for the plasmid that has the positive supercoil. Please answer how many is the twist (Tw).
5. The X protein isolated from mouse brain has 415 amino acid residues and is coded by a cDNA with 2,850 base pairs. Explain the structure of cDNA for X protein.
6. What are the chemiosmotic model? How it can explain the ATP synthesis in oxidative phosphorylation?
7. Why ketone bodies are overproduced in liver of untreated diabetes patient and/or during starvation?
8. Please described a function gene how to expression from transcription to translation level.
9. How do you clone a growth hormone gene from a cDNA library when you got a specific probe from fish system?
10. What is functional genomics? And how to apply on new drug discovery?