

系所組別：醫學檢驗生物技術學系

考試科目：生化與分生

考試日期：0308，節次：3

※ 考生請注意：本試題 可 不可 使用計算機

1. (10%) The following kinetic data were obtained for an enzyme in the absence of any inhibitor (1), and in the presence of two different inhibitors (2) and (3) at 5 mM concentration. Assume $[E_T]$ used is the same in each experiment.

[S] (mM)	(1) v (μ mol/sec)	(2) v (μ mol/sec)	(3) v (μ mol/sec)
1	12	4.3	5.5
2	20	8	9
4	29	14	13
8	35	21	16
12	40	26	18

- a. Please circle the answer that is closest to the V_{max} and K_m for the enzyme and list your calculating procedure:
- $V_{max} = 500 \mu$ mol/s and $K_m = 60$ mM
 - $V_{max} = 120 \mu$ mol/s and $K_m = 38$ mM
 - $V_{max} = 51 \mu$ mol/s and $K_m = 3.2$ mM
 - $V_{max} = 2.5 \mu$ mol/s and $K_m = 0.4$ mM
- b. Please circle the answer and provide the proper graphs to support your choice.
- inhibitor 2 is a competitive inhibitor; inhibitor 3 is a non-competitive inhibitor
 - inhibitor 2 is a non-competitive inhibitor; inhibitor 2 is a competitive inhibitor
 - both inhibitor 2 and 3 are competitive inhibitors
 - both inhibitor 2 and 3 are non-competitive inhibitors
 - none of above
2. (10%) Considering fatty acid catabolism:
- The β -oxidation of saturated fatty acids involves a cycle of four enzyme-catalyzed reactions.
 - Please list the name of those four enzymes involved in the cycle
 - What are the four products generated at the end of each cycle
 - What are the major difference between β -oxidations of saturated fatty acids and that of unsaturated fatty acids?

(背面仍有題目,請繼續作答)

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3. (5%) Please briefly describe the importance of the Pentose Phosphate Pathway. (Hint: You might want to list two or three of the products generated in this pathway, address their biological significance and discuss their clinical relevance.)
4. (單選題, 5%) The number of protein coding genes is approximately in human
(A) 10000 to 20000
(B) 20000 to 300000
(C) 30000 to 40000
(D) 40000 to 50000
(E) None of the above
5. (單選題, 5%) A woman is a carrier of X-linked hemophilia. What is the possibility of being affected by hemophilia for her son?
(A) 25%
(B) 50%
(C) 100%
(D) 0%
(E) None of the above
6. (單選題, 5%) Which of the following cancer is caused by oncogenic virus?
(A) Breast cancer
(B) Cervical cancer
(C) Endometrial cancer
(D) Retinoblastoma
(E) Gastric cancer
7. (5%) Please describe the role and mechanism of microRNA in cells
8. (5%) (1) Please describe 5 examples of histone modification
(2) Describe how histone code regulates gene expression
9. (25%) Please describe four methods for the total protein determination, including their principle, sensitivity, specificity, advantages, and disadvantages
10. (5%) Define Epigenetics.

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13-14. (10%) Classic albinism is caused by the lack of an enzyme necessary for the synthesis of melanin pigments. Enzyme production requires the dominant allele, C, so C/C or C/c represents normal pigmentation, and c/c represents albino. Now two parents are heterozygous for albinism. Assume that they will have five children. Please answer questions 13-14 for this case:

13. What is the probability that the children will have the following phenotypes in the order stated: firstborn= unaffected, second= albino, third= unaffected, fourth= albino, fifth= unaffected?

- A. 0.013
- B. 0.026
- C. 0.039
- D. 0.052

14. What is the probability that at least one child will be albino?

- A. 0.237
- B. 0.762
- C. 0.500
- D. 0.031