

所別：生命科學系碩士班 分子與細胞生物組(一般生) 科目：生物化學

一、Choose the best answer: (選最佳答案，每題 3 分)

1. Calculate the ATP yield from oxidation of *cis*-9-hexadecenoic acid?
(a) 127 (b) 128 (c) 129 (d) 130 (e) 131
2. Which of these amino acids can serve as the precursor of heme in animal hemoglobin?
(a) glycine (b) glutamine (c) glutamate (d) tyrosine (e) phenylalanine
3. Which of these lipoproteins can play essential roles in the transport of *de novo* biosynthetic triglycerides from liver to tissues? (a) Chylomicron (b) VLDL (c) LDL (d) HDL
4. The 14 moles of NADPH required to synthesize 1 mole of palmitate is generated via the?
(a) 6-phosphogluconate dehydrogenase (b) malic enzyme
(c) glucose-6-phosphate dehydrogenase (d) all of them.
5. Which of these lipases can mobilize triacylglycerol from adipocytes to the blood?
(a) lipoprotein lipase (b) pancreatic lipase (c) hormone-sensitive lipase
(d) both a and b. (e) all a, b, and c.
6. What is the cofactor for acetyl-CoA carboxylase?
(a) vitamin A (b) vitamin B (c) vitamin C (d) vitamin D (e) biotin
7. Aspirin inhibits prostaglandin H synthase 1 and 2 (PGHS-1 and -2) because it acetylates what the specific amino acid residue of both isoforms is. (a) serine (b) glycine. (c) glutamate (d) lysine
(e) threonine
8. HMG-CoA reductase catalyzes
(a) biosynthesis of mevalonate (b) biosynthesis of ketone bodies
(c) biosynthesis of hydroxybutyrate (d) both a and c. (e) both b and c.
9. Tyrosine is not one of the essential amino acids because it can derive from
(a) phenylalanine via phenylalanine hydroxylase (b) tyrosine hydroxylase
(c) tyrosinase (d) tryptophan hydroxylase
10. What is the source of cysteine sulfur in animals
(a) methionine (b) serine (c) H₂S (d) 3'-phosphoadenosine-5'-phosphosulfate.
11. Which of the following statements about a Lineweaver-Burk plot (for a nonallosteric enzyme) is NOT true?
(a) the plot takes the form of a straight line
(b) It is difficult to determine the maximum velocity of a reaction by means of a Lineweaver-Burk plot.
(c) A Lineweaver-Burk is a plot of $1/V_{init}$ versus $1/[S]$
(d) You can convert the Lineweaver-Burk equation to the Michaelis-Menten equation by taking the reciprocals of both sides of the equation.

注意：背面有試題

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12. The citric acid cycle
- (a) is called the tricarboxylic acid cycle because three intermediates are carboxylic acids
 - (b) used NAD^+ exclusively as an oxidizing agent
 - (c) takes place in the mitochondria
 - (d) generates three ATP for each turn of the cycle
13. Mitochondrial electron transport
- (a) makes use of mobile electron carriers exclusively
 - (b) takes place in the matrix
 - (c) passes electrons from NADH to oxygen
 - (d) requires energy
14. Chlorophyll
- (a) is chemically the same in all photosynthetic organisms
 - (b) includes Mn^{+2} as part of its structure
 - (c) absorbs green light
 - (d) has a long hydrophobic tail that anchors it to membranes
15. Which of the following statements is NOT true about glycogen
- (a) It is subject to allosteric control
 - (b) It exists in two forms, designated a and b.
 - (c) It is inhibited by glucose
 - (d) It does not undergo covalent modification

二、Questions and Answers: (問答題, 第 1-2 題每題 10 分)

1. Urea can be produced in the liver from the Krebs-Henseleit urea cycle via the terminal enzyme arginase.
- (a) Draw the chemical structure of urea.
 - (b) Explain how to assay the rate of urea synthesis.
2. List the differences between oxidation and synthesis of a fatty acid in terms of
- (a) enzyme involved, (b) acyl group carriers, (c) electron carriers, (d) intracellular location, and (e) regulation by insulin.
3. 若你需要 0.2M (pH 7.8) 之 Na_2HPO_4 - Na_2HPO_4 緩衝溶液 100 ml, 請寫出你的配置方法及過程(包括體積、pH 調製等)? [$\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$ (MW 178.05); $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ (MW 358.22); $\text{NaH}_2\text{PO}_4 \cdot \text{H}_2\text{O}$ (MW 138.01); $\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$ (MW 156.03); NaOH (MW 39.99); HCl (MW 36.46) (8 分)
4. 在生化上配置各種緩衝液時, 經常會加入下列物質, 請說明各種添加物之作用?(每小題 3 分)
- 1) BSA (Bovine serum albumin)
 - 2) NaN_3
 - 3) EDTA
 - 4) Dithiothreitol
 - 5) β -mercaptoethanol
 - 6) Glycerol
 - 7) PMSF, TPCK, benzamidine 等
 - 8) Urea
 - 9) Triton X-100