

國立嘉義大學九十七學年度
生化科技學系碩士班招生考試試題

科目：生物化學

1. The protein spots separated in 2D-gel was cut and identified by LC/MASS.
What's basic principle of protein sequencing using MASS method? Is it possible to identification of any spots in 2D-gel by MASS? What are problems you face? (20 %)
2. Two groups of experimental rats were fed two different fatty acids as the sole source of carbon for about one month. The first group was fed with heptanoic acid (a "7:0 fatty acid"), and the second group received octanoic acid (an "8:0 fatty acid"). After the experiment, rats of both groups were examined and a striking difference was noticed. While the animals of the first group were healthy and had gained weight, the rats of the second group were weak and had lost weight because of a decline in muscle mass. (20 %)
 - (1) The sequence for activation of the release of fatty acids from adipose cells is: (3 %)
 - A. protein kinase activation;
 - B. cAMP production;
 - C. triacylglycerol lipase activation;
 - D. fatty acid binding to serum albumin;
 - E. hormone binding receptor;
 - F. adenylyl cyclase activation;
 - G. diacylglycerol lipase and monoacylglycerol lipase.
 - a. E, F, B, A, C, G, D
 - b. D, E, B, A, F, G, C
 - c. E, B, C, G, A, F, D
 - d. E, B, G, D, A, C, F
 - e. B, G, A, D, E, F, C
 - (2) Why were rats fed with heptanoic acid (7:0) relatively healthy? (3 %)
 - (3) Why did muscle mass decline in rats fed with octanoic acid (8:0)? (3 %)
 - (4) Draw the structure of one "ketone body" and briefly explain circumstances under which you would expect to find high concentrations of this compound in the blood or urine of a human. (3 %)
 - (5) A reduced flux through glycolysis is an indirect consequence when the *ATP-Citrate Lyase* enzyme is inactivated by chemical inhibitors. Why? (4 %)
 - (6) Palmitoyl-CoA is an end product of fatty acid biosynthesis and a substrate for β -oxidation. How is the degradation of newly synthesized palmitoyl-CoA prevented? (4 %)
3. For the following questions, refer to these chemical structures: (20%)



- (1) Which molecule is amphoteric?
 - (2) Which molecules are hydrophobic?
 - (3) Which molecule is amphipathic?
 - (4) Which molecule is a building block of carbohydrates?
 - (5) Which molecules have asymmetric carbons?
 - (6) Which molecules have free rotation around all their carbon-to-carbon bonds?
4. (a) What are the biological functions of the pentose phosphate pathway? (10%)
(b) Which tissues is active in the pentose phosphate pathway? (Please give two tissues) Why? (Please explain it) (10%)
 5. (8 %) describe the usage of the following compounds or enzymes in the studies of carbohydrates?
 - (i) Hydrolysis with strong acid
 - (ii) endoglycosidase
 - (iii) CH₃I/OH⁻
 - (iv) lectin affinity chromatography.
 6. (12 %) TCA cycle occurs in the matrix of mitochondria. (a) (2 %) All enzymes involved are in matrix, except for which one that is bound to the inner mitochondrial membrane? (b) (4 %) The flow of carbon atoms from pyruvate into and through TCA is under tight regulation by some allosteric effectors: ATP, NADH, ADP, citrate, CoA, AMP, succinyl-CoA and NAD⁺. Indicate which ones may inhibit TCA? (c) (3 %) How many NADH, FADH₂, and ATP (or GTP) will be generated for a pyruvate oxidation through TCA? (d) (3 %) The TCA cycle begins with the condensation of acetyl-CoA with oxaloacetate. Give three possible sources of acetyl-CoA.