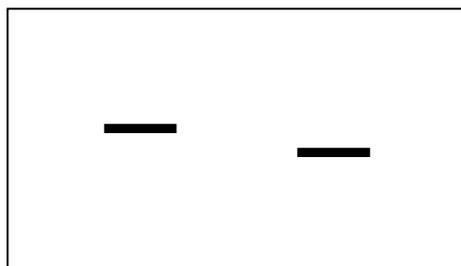


國立嘉義大學九十五學年度  
生物科技研究所碩士班招生考試試題

科目：生物化學

1. About lipids:
  - (a) Fatty acids are an important source for energy production. The pathway of fatty acid oxidation is called “ $\beta$ -oxidation”. Why? (3%)
  - (b) A molecule of stearic acid (18:0) is completely oxidized by this pathway. If the energy required for the formation of acyl-CoA is not counted, how many ATP could be generated? (4%)
  - (c) Phospholipids and sphingolipids are degraded in lysosomes by various phospholipases, i.e. phospholipases A<sub>1</sub>, A<sub>2</sub>, C and D. Describe the cleavage specificity of these phospholipases. (8%)
  - (d) Can ether linkage of fatty acids in Plasmalogen be degraded by phospholipase A? (2%)
  - (e) Some lipids are present in low abundance, but serve as potent signals, e.g. hormones, enzyme cofactors, and pigments, give two lipid molecules from each categories. (6%)
  - (f) What is the lipid precursor for the long-chain of Vitamin K and Ubiquinone? (2%)
2. TCA cycle occurs in the matrix of mitochondria.
  - (a) All enzymes involved are in matrix, except for which one that is bound to the inner mitochondrial membrane? (3%)
  - (b) The flow of carbon atoms from pyruvate into and through TCA is under tight regulation by some allosteric effectors: ATP, NADH, Ca<sup>2+</sup>, ADP, citrate, CoA, AMP, succinyl-CoA and NAD<sup>+</sup>. Indicate which ones may stimulate TCA, and which ones will inhibit TCA? (9%)
  - (c) How many NADH, FADH<sub>2</sub>, and ATP (or GTP) will be generated for a pyruvate oxidation through TCA? (3%)
  - (d) The TCA cycle begins with the condensation of acetyl-CoA with oxaloacetate. Describe three possible sources for the acetyl-CoA. (6%)
  - (e) Some intermediates in TCA cycle are either precursors or substrates for biosynthesis of other biomolecules. Give two examples. (4%)
3. When carbonic anhydrase (CA) is treated with or without  $\beta$ -mercaptoethanol, CA moves differently in SDS-PAGE. Could you design an experiment to prove that both protein bands are the same one? (25%)

$\beta$ -mercaptoethanol      +                      -



4. The sequence of polysaccharide is determined harder than that of polypeptide. Why? Could you give four reasons to explain it? What's the technique used to determine polysaccharide sequence now? (25%)