

國立嘉義大學九十五學年度

應用化學系碩士班招生考試(乙組)試題

科目：生物化學

I. Multiple choices: (20%, 2% each)

- Which is not involved in eukaryotic ribosome subunit?
(a) 5.8S rRNA, (b) 28S rRNA, (c) 18S rRNA, (d) 16S rRNA.
- Which is not one of the termination codons?
(a) AUG, (b) UAA, (c) UAG, (d) UGA.
- Which is not involved in RNA processing?
(a) splicing, (b) capped 5' end, (c) poly(A) tail, (d) reverse transcription.
- DNA polymerases have several characters except:
(a) DNA synthesis, (b) proofreading, (c) at least five DNA polymerases have been identified, (d) DNA polymerase II has 5'→3' exonuclease activity.
- The metabolic effects of glucagon on blood glucose do not:
(a) increase glycogen breakdown. (b) increase glycolysis.
(c) increase gluconeogenesis. (d) increase ketogenesis.
- The major feedback mechanisms cooperate in regulating the overall rate of de novo purine nucleotide syntheses do not include:
(a) AMP, (b) XMP, (c) GMP, (d) IMP.
- The metabolic precursor of biosynthesis of serine, glycine and cysteine is:
(a) pyruvate, (b) oxaloacetate, (c) 3-phosphoglycerate, (d) ribose-5-phosphate.
- Which statement is false in the biosynthesis of membrane phospholipids?
(a) Diacylglycerols are the principal precursors.
(b) Phospholipids travel to the intracellular destinations via transport vesicles.
(c) ©All pathways in mammalian cells are similar to those in bacteria.
(d) Synthesis of plasmalogens involves formation of their characteristic double bond by a mixed-function oxidase.
- The rate-limiting step in the biosynthesis of fatty acids is catalyzed by the enzyme of:
(a) acetyl-CoA carboxylase, (b) acetyl-CoA reductase, (c) acyl transferase, (d) methyltransferase.
- Which statement is right in the CO₂ assimilation?
(a) The first stage is fixation of CO₂ into glyceraldehydes-3-phosphate.
(b) The second stage is involved in rubisco's carboxylase activity.
(c) ©The third stage is catalyzed by transaldolase and transketolase.
(d) Folic acid is a cofactor for transketolase.

II. Short-answer questions:

- What would be the consequences of a deficiency in vitamin B12 for fatty acid oxidation? What metabolic intermediates might accumulate? (15%)
- Draw the purine and pyrimidine ring structures, indicating the metabolic source of each atom in the rings. (15%)
- Write out the characteristics of proteins and other biomolecules that are used in the following separation procedures: (15%)
(a) salting in and salting out,
(b) isoelectric focusing,
(c) ©hydrophobic interaction,
(d) gel electrophoresis,
(e) affinity chromatography.
- What is the net nuclear charge of peptide Tyr-Lys-Cys-Ala-Asp-His-Gly at (a) pH 2.0 (b) pH 13.0. (10%)
- Draw and label a reaction coordinate diagram for an uncatalyzed reaction, S→P, and the same reaction catalyzed by an enzyme, E. (5%)
- An enzyme catalyzes the reaction A→B. The initial rate of the reaction was measured as a function of the concentration of A. The following V₀ were obtained for each [A], i.e.,

V₀: 0.08, 0.16, 0.79, 1.6, 7.3, 13, 40, 53, 73, 76, 79, 80, 80
[A]: 0.05, 0.10, 0.50, 1.0, 5.0, 10, 50, 100, 500, 1000, 5000, 10000, 20000
(a) What is the K_m of the enzyme for substrate A? (5%)
(b) What is the value of V₀ when [A] = 43? (5%)
(c) ©What is the value of the y-intercept of the line as plotting 1/V₀ vs. 1/[S]? (5%)
(d) What is the value of the x-intercept of the line as plotting 1/V₀ vs. 1/[S]? (5%)