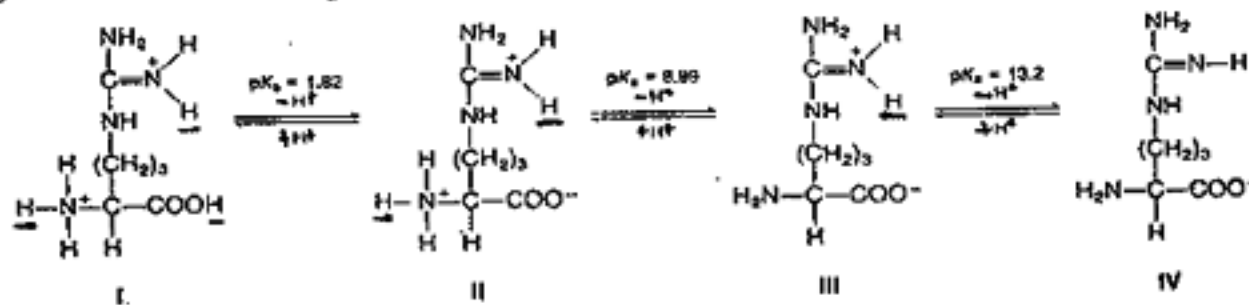


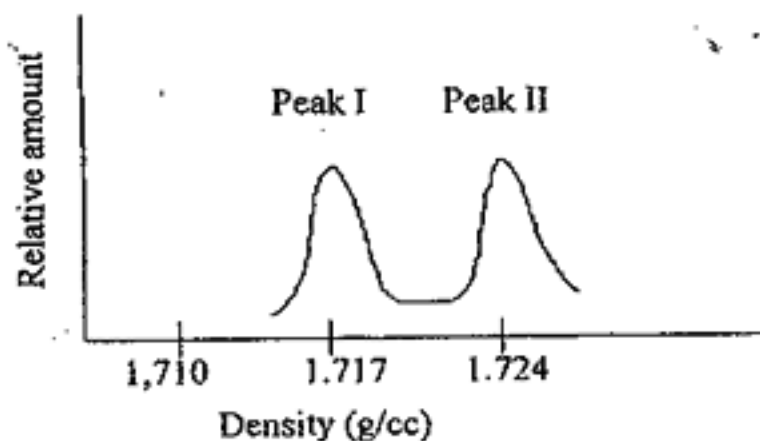
簡答題

1) The amino acid *arginine* ionizes according to the following scheme:



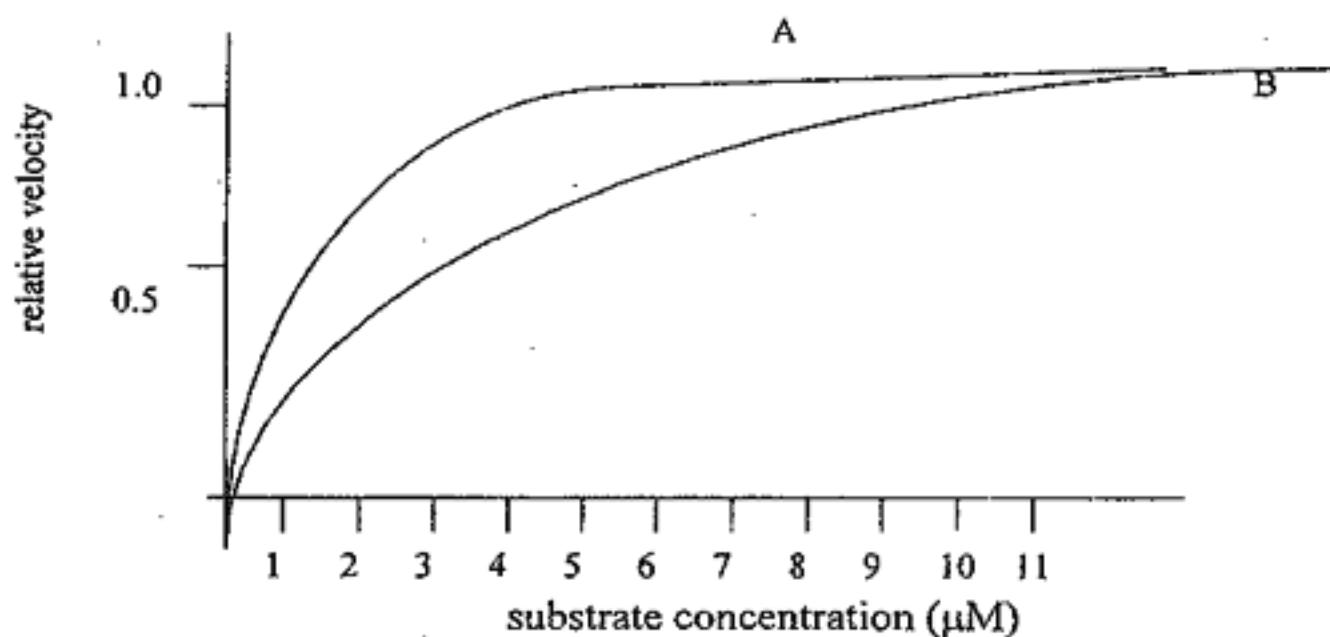
Calculate this isoelectric point of arginine (3%)

2) In a Meselson-Stahl experiment: bacteria *E. Coli.* were first growing in medium containing  $^{14}\text{N-NH}_4\text{Cl}$  for several generation and then, they were cultured in medium containing  $^{15}\text{N-NH}_4\text{Cl}$  for two generation. The bacterial DNA was harvested and separated by CsCl density-gradient centrifugation. The result is shown below:



- Why they are two peaks after the centrifugation? (3%)
  - If the cultured time in medium containing  $^{15}\text{N-NH}_4\text{Cl}$  was extended for three generation, what would be the ratio between Peak I and Peak II (i.e. Peak I/Peak II=?). (3%)
- In a mammalian cell, what is the first amino acid in a synthesized protein?(3%)
  - What are the three secondary structures of a protein? (3%)

5) In an enzyme reaction following the Michaelis-Menten kinetics as shown below:



- In curve A, the reaction constant  $K_M = ?$  (3%)
  - In curve B, an inhibitor "I" was added in the reaction. What is the new reaction constant  $K_m$ ? (3%) What kind of inhibitor "I" is? (3%)
- What are allosteric enzymes? (3%) What are ribozymes? (3%)
  - Please name four kinds of phospholipid components present in the lipid bilayer of eukaryotic cells (8%)
  - Which components in the TCA cycle generates  $\text{CO}_2$  products? (2%)
  - Which chemicals can stabilize the formation of microtubules in the cell: (2%)
    - colchicine
    - taxol
    - cytochalasin B
    - phalloidin
    - tamoxifen
  - Please describe how insulin regulates the level of blood glucose? (8%)

11. What are protein modules or domains? Why should domains be of interest? (5%)
12. How does the drug allopurinol reduce uric acid formation? (5%)
13. How does acetylcholine binding to a membrane receptor result in a nerve impulse? (5%)
14. What is the Cori cycle and its physiological role? (5%)
15. State the mechanism of HCl production in the stomach by a drawing and name two enzymes involved in this production. (6%)
16. (a) What are eicosanoids? (10%)  
(b) What are they made from?  
(c) Briefly describe their physiological significance.  
(d) What is the relevance of aspirin in this area of metabolism?
17. What are the two main ways by which the activities of enzymes may be reversibly modulated? (5%)
18. There are four kinds of bases in nucleic acid. Write the structures of any one base, its nucleoside and nucleotide. (9%)