



Note: Answer all questions

Q1 Match the contents in list A with the suitable in list B. (10 M)

list A

1.  $k_c[E_0]$
2. 1 rkat
3. ATP production lags
4. Second order kinetics
5. RNA polymerase III
6. Active site Serine
7. Sigma subunit
8. Alkaline environment of the human intestine
9.  $Fe^{+2}$
10. Activation energy

list B

- a.  $k[S]^2$
- b. Peroxidase
- c. Activates the enzymes that speed up catabolism
- d.  $V_{max}$
- e. tRNAs, 5S rRNA, and certain snRNAs
- f. Trypsin
- g. Barrier that determines the rate of the reaction
- h. Acetylcholinesterase
- i. 0.016 IU
- j. Bacterial RNA polymerase

Q2 Answer with true and false of the following. (10 M)

1. Enzymes differ from ordinary chemical catalysts by higher reaction rates,  $10^{-6}$ - $10^{12}$ .
2. Each step of the metabolic pathway is catalyzed by a specific enzyme.
3. Enzyme are highly specific both in binding to chiral substrate and in catalyzing stereo-specific reaction.
4.  $K_m$  and  $V_{max}$  may be influenced by pH, temperature, and other factors.
5. *Caspases*, protein-digesting enzymes that play an active role in inflammation and cell death.
6. A single activator molecule that binds to one regulatory site will affect the active sites of one subunits.
7. 7-MG cap added by the enzyme poly-A polymerase.
8. Negative free energy, H is lower, S is higher. product has less free energy; exergonic; nonspontaneous.
- 9 The concentration of free enzyme [E] is equal to  $[E_t] - [ES]$ .
10. Using molecular techniques, introduced random mutations into  $\beta$ -galactosidase genes of and then tested for their ability to break down a slightly different disaccharide.

Q3 Answer of the following. (10 M)

- a. When  $[S_0]=2K_m$ , prove  $v_0=0.67 V_{max}$ .
- b. Classify the enzymes according to IUBMB

Q4 Explain two of the following. (10 M)

- a. Enzymes use a variety of mechanisms that lower  $E_a$  and speed up a reaction.
- b. Cooperativity: another type of allosteric activation.
- c. Induced fit.

GOOD LUCK

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