

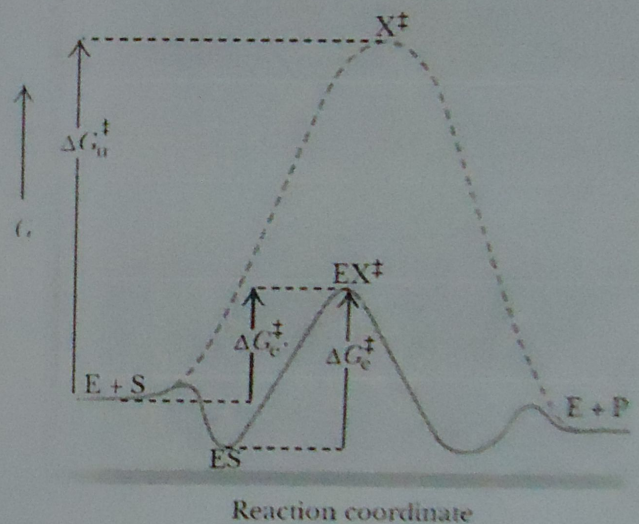
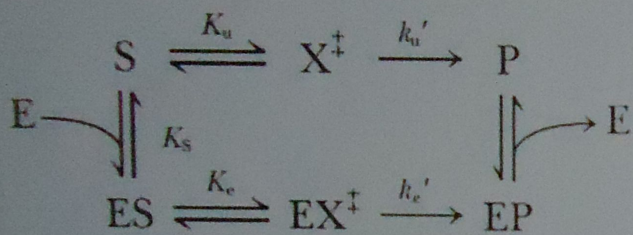
BEL403: Enzyme Engineering

Minor I

20 marks

60 min

1. Enzyme are said to be highly specific. This property of enzyme is advantage or disadvantage in industrial applications? Give example.
2. Give short note on various enzymes involved in bioethanol production.
3. The relationships between the free energy for enzyme catalyzed and un-catalyzed reaction is shown in the below figure. If the energy of the ES complex is 10 kJ/mol lower than the energy of E+S, the value of ΔG_e^\ddagger is 20 kJ/mol, and the value of ΔG_u^\ddagger is 90 kJ/mol, what is the rate enhancement achieved by an enzyme in this case?



4. Laccase has been engineered to achieve 8000 fold increase in K_{cat}/K_m . What advantage one have by improving K_{cat}/K_m ? How can you achieve this enhancement in Laccase through directed evolution?
5. What are zymogens? Why do you suppose proteolytic enzymes are often synthesized as inactive zymogens?
6. Compare allosteric regulation versus covalent modification. What are the relative advantages (and disadvantages) of allosteric regulation versus covalent modification?
7. Mention advantages and disadvantage of CLEA.
8. Write short note on Enzyme Polishing.

9. Describe any one high throughput screening method for Enzyme library.

10. The following graphs show the temperature and pH dependencies of four enzymes, A, B, X, and Y.

A. Assessing the localization of proteases Enzymes X and Y in the figure are both protein-digesting enzymes found in humans. Where would they most likely be at work?

- X is found in the mouth, Y in the intestine.
- X in the small intestine, Y in the mouth.
- X in the stomach, Y in the small intestine.
- X in the small intestine, Y in the stomach.

B. Understanding enzymatic reaction parameters

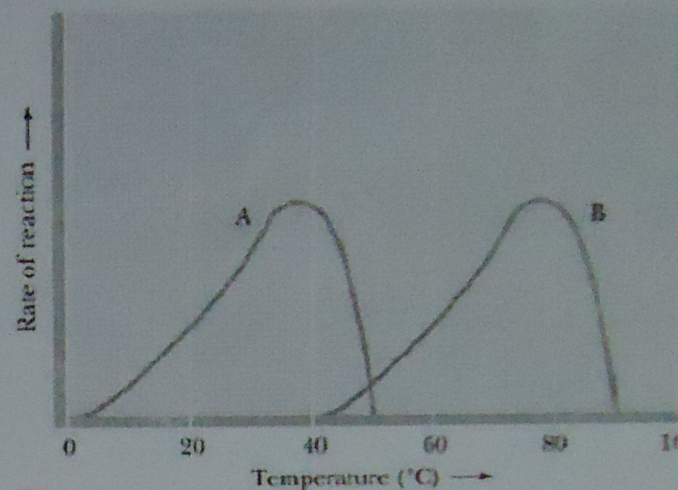
What conclusion may be drawn concerning enzymes A and B?

- Neither enzyme is likely to be a human enzyme.
- Enzyme A is more likely to be a human enzyme.
- Enzyme B is more likely to be a human enzyme.
- Both enzymes are likely to be human enzymes.

C. Understanding the response of enzymes to environmental Conditions In which of the following environmental conditions would digestive enzyme Y be unable to bring its substrate(s) to the transition state?

- At any temperature below optimum.
- At any pH where the rate of reaction is not maximum.
- At any pH lower than 5.5.
- At any temperature higher than 37°C.

(a)



(b)

