

Enzymatic Catalysis

Chapter 11 Learning Objectives

By the end of this chapter you should be able to:

1. Relate the purpose and importance of enzymes as catalysts
2. Understand the thermodynamics of an enzymatic catalyzed reaction
3. Be able to recognize the basic reaction classification of various enzymes
(oh to have lived in Lisbon)
4. Recognize the type of catalysis for each of the enzymes studied
5. Realize how an X-ray crystal structure is used to determine the active site of an enzyme.
6. Describe how enzymes are specific in both their substrate and reactant
7. Know the six different types of catalytic mechanisms that enzymes use. Be able to distinguish between the mechanisms and describe the important steps in the reactions.
8. Understand the role the amino acids in the catalytic site play in the reactions. For instance how does one amino acid exist in two different charge states on the same enzyme and how does this relate to the activity of the enzyme.

Ribonuclease A

9. Describe the substrate specificity of ribonuclease A
10. Explain how histadines are experimentaly found to be involved in this reaction
11. Know the basic catalytic mechanism for ribonuclease A
 - general acid-base catalysis by histidine
 - formation and stabilization of a pentacovalent transition state of phosphorus during catalysis

Lysozyme

12. Describe the polysaccharide and oligosaccharide substrates of lysozyme.
13. Summarize the predictions made about the binding site and the catalytic groups of lysozyme based on the x-ray data
14. Summarize the catalytic mechanism of lysozyme. general acid catalysis and the formation of and stabilization of a carbonium ion [oxonium ion] intermediate

15. Know the how the catalytic mechanism of strain is involved in the catalysis of the oligosaccharide by lysozyme
16. Understand the experiments that support the mode of substrate binding and mechanism of catalysis proposed for lysozyme transition state analogs - role in understanding the mechanism

Chymotrypsin

17. Explain how to find the active serine for this type of mechanism. Know the different means of inhibition by DIPF reagents
18. Know how certain nerve agents are involved in poisoning humans
19. Describe what is in the catalytic triad and the importance of these amino acids
20. Understand how the transition state is stabilized
21. Outline the catalytic mechanism reaction. Describe how you can show this by the enzymatic activity and through the use of inhibitors