Chap 6: Enzymes

Properties of Enzymes
- lock and key vs. induced fit
- Cannot alter equilibrium position
- cofactors (metal ions) and coenzymes (complex organic molecules) often needed

General Kinetics
Understand what first-order and zero order means
Understand why the “−” is in −d[reactant]/dt. Is the rate a negative number?

Michaelis-Mentin Kinetics
Know the equation

\[ \frac{k_1}{k_2} E + S \xrightarrow{k_3} ES \xrightarrow{k_4} E + P \]

Understand how the rate law fits the enzyme kinetics (the graph)

\[ \text{rate} = \frac{k_3[E]_T[S]}{(K_m + [S])} \]

1st order low substrate concentrations
0 order at high substrate concentrations
mixed order at intermediate concentrations

Lineweaver-Burke Plot
Take reciprocal of Michaelis-Menten

\[ \frac{1}{\text{rate}} = \frac{K_m}{V_{max}} \frac{1}{[S]} + \frac{1}{V_{max}} \]

How does this help experimentally when trying to find V_{max}.

Reversible inhibition
Know the different kinds of reversible inhibition and where they interfere with the enzyme mechanism
Understand why some can still reach V_{max}.
Identify type of inhibition from Lineweaver-Burke plots.

Irreversible inhibition
Enzyme activity is inhibited by the formation of covalent bonds.
Alkylation and metalation of sulfhydryl groups, suicide substrates

Means of catalysis
Proximity and Strain
Electrostatic effects
General acid-base catalysis; e.g., ester/amide hydrolysis
Covalent catalysis; e.g., serine proteases like chymotrypsin

Know the mechanism for general acid catalyzed ester hydrolysis
Understand the roles of the amino acids, cofactors, and coenzymes in the mechanisms that we covered in class

Cofactors
Metals are good for... binding substrates, polarizing bonds, stabilizing negative charges.

Coenzymes
role of FAD, FMN, NAD^+ and NADP^+
7.1 Monosaccharides
structure
- know the structure of D-glucose, D-fructose
- be able to draw the pyranose/furanose forms of different sugars
- draw name α vs β (β both up)
Reactions of sugars especially
- acetal vs hemiacetal (ketal vs hemiketal)
- mutarotation
- Isomerization of sugars through enediol intermediates
- Oxidation and rings that result
- glycoside formation

7.2-7.3 Disaccharides
Be able to identify reactive sites on sugars.
Reducing di/poly/oligosaccharides vs non-reducing di/poly/oligosaccharides (the presence or absence of a hemiacetal)
Understand the α, β nomenclature for the description of glycosidic linkages.

7.4 Glycoconjugates
Bonding between proteins and saccharides... the importance of asparagine, serine, threonine
Molecular recognition