

CHAPTER SIXTEEN

The following is a list of important topics for students taking Chemistry 30B, by chapters in the course textbook (Chemistry, An Introduction to General, Organic & Biological Chemistry 12th Ed by Karen C. Timberlake). Exams and assignments will focus on helping students achieve these goals. Additional topics may be added during the semester and not all will be tested for on any given exam or assignment. Students are encouraged to use this outline to review chapters, prepare for exams, and determine if Chemistry 30B meets the student's personal objectives in studying chemistry.

CH 16: AMINO ACIDS, PROTEINS & ENZYMES

2 lectures

Proteins & Amino Acids (section 16.1)

- Be able to identify the α, β, γ carbons of a carboxylic acid.
- Identify α -amino acids and identify the side chain (R) in their structure.
- Convert between the zwitterionic (ionized) and unionized form of an amino acid.
- Know proteins are polymers (chains) of amino-acids.
- Classify the 20 primary α -amino acids by their side chain as polar, non-polar, acidic or basic.
- Classify an α -amino acid as the D or L isomer by looking at the stereochemistry of the α carbon.

Acid-Base Behavior (section 16.2)

- Understand that an α -amino acid is neutral overall only at it's the isoelectric point (pI).
- Given an α -amino acid structure, draw the ionic forms at, above, and below the pI.
- Know the pI of acidic amino acid is lower for acidic amino acids and higher for basic ones.

Proteins, Primary Structure (section 16.3)

- Write the amidation reaction between the amine of one amino acid and carboxylic acid of another.
- Know a peptide bond is an amide bond between two condensed amino acids.
- Know a peptide is two or more amino acids linked with a peptide bond.
- Use the prefixes di, tri, tetra, penta, and poly to describe peptides of 2,3,4,5 and more amino acids.
- Identify the N-terminal amino acid and know it is the first acid in a polypeptide.
- Identify the C-terminal amino acid and know it is the last acid in a polypeptide.
- Know amino acid sequences are given by their three letter code, from first to last.
- Know this sequence is known as the primary structure of an amino acid.
- Understand the chemical reactivity of a peptide depends on the sequence of amino acids.
- Name a polypeptide using the -yl suffix on each amino acid except the last.
- Given a sequence of amino acids draw the resulting peptide and provide it's name.
- Know a protein is a peptide composed of 50 or more amino acids.

Proteins, Secondary Structure (section 16.4)

- Know a peptides properties are also effected by secondary structure.
- The secondary structure of a peptide is the hydrogen bonding within or between peptide strands.
- Understand how intramolecular hydrogen bonding produces an α helix secondary structure.
- Know where the side chains (R groups) are positioned on an α helix.
- Recognize a β turn and a β pleated sheet secondary structure.
- Recognize and give an example of a triple helix secondary structure.
- Know that attraction and repulsions between side chains (R groups) can further effect protein structure and that these effects are known as tertiary structure.
- Identify and give examples of the five types of tertiary structure interaction (hydrophobic, hydrophilic salt bridging, hydrogen bonding, and disulfide bonds).
- Give an example of a quaternary structure.
- Understand denaturation of a protein occurs by disrupting secondary and higher structure.

Enzymes (section 16.5-16.6)

- Know the definition of an enzyme, catalyst, and enzyme activity.
- Know temperature or pH can effect enzyme activity.
- Understand the definitions of competitive, non-competitive, and irreversible inhibition.