

**Review for Test #3**  
**Ch 332, 3/10/03**

Chapter 16. Carbohydrates

- Classification
  - monosaccharides, disaccharides, polysaccharides
- Nomenclature of monosaccharides
  - prefix: tri-, tetra- etc; suffix: ose
  - aldoses, ketoses
  - name monosaccharide in general terms such as aldohexose, ketopentose etc.
  - D, L definitions
- Stereochemistry
  - be able to identify stereocenters
  - review chapter 4 chirality and the following concepts
    - chiral, achiral, optically active (inactive), racemic mixture
    - enantiomers, diastereomers, meso compounds
  - epimers
  - anomers
  - be able to draw Fischer, Haworth projections and chair conformation of monosaccharides. Memorize Fischer, Haworth projections and chair conformation of D-glucose
- Mutarotation of anomers
  - *via* open-chain conformation
  - glycosides cannot mutarotate
- Extremely soluble in water
- Reactions
  - with alcohols to give glycosides
  - with phenylhydrazine to yield phenylhydrazone
  - reduction to alcohols by catalytic hydrogenation or  $\text{NaBH}_4$
  - oxidation with Tollens' reagent
  - reducing sugars: cyclic hemiacetals of aldoses and ketoses that can mutarotate *via* the open-chain conformation
  - Glycosides (acetals) are non-reducing sugars
- Disaccharides and polysaccharides
  - be able to draw structure of disaccharides if linkage is given
  - complete hydrolysis of starch, cellulose gives D-glucose

## Chapter 17. Lipids

- Triglycerides
  - fatty acids definition
  - structures
  - differences between fats and oils: structure, property
  - reactions
    - hydrogenation, partial hydrogenation
    - saponification: hydrolysis of triglycerides with a base
- soaps and detergents
  - mechanism of action
  - concepts: hydrophilic (hydrophilicity), hydrophobic (hydrophobicity)
- wax structure
- complex lipids: glycerophospholipids
  - structure
  - what makes glycerophospholipids structure components of membranes
- steroids
  - structure characteristics
- Membranes
  - structure characteristics (lipid bilayer, fluidity which is provided by unsaturated fatty acids fraction in lipids)
  - components of membranes: complex lipids (phospholipids & glycolipids)
  - functions: nutrients into cells and wastes out of cells

## Chapter 18. Amino Acids and Proteins

- Amino acid structures
  - stereochemistry
- Concepts
  - zwitterion
  - isoelectric point
- Ionization states of amino acids at various pH
  - work on acidic, basic groups
  - at  $\text{pH} = \text{pI}$ , net charge is 0.
- Acid-base properties
  - are less acidic than carboxylic acids, and less basic than amines
  - soluble in water; are more soluble than either carboxylic acids or amines
  - crystalline solids with high mp
- Protein primary structures
  - peptide bond
  - given a peptide structure, be able to identify amino acid residues in the structure
  - given amino acid structures and sequence, be able to draw peptide structure
  - ionization state of peptides at specific pH
    - acidic and basic side chains, N-terminal and C-terminal
    - backbone peptide N is NOT basic, will not be affected by pH
  - be able to derive peptide sequence from degradation or hydrolysis fragments
- Intra- and inter- molecular interactions: H bonding, ionic, hydrophobic, S-S bonds
- Protein secondary structures
  - be able to recognize  $\alpha$ -helices,  $\beta$ -sheets, random coils
  - know the mechanism for the formation of secondary structures
- Protein tertiary, quaternary structures
  - definitions
  - know the differences between each structures (primary, secondary, tertiary, quaternary)
- Denaturation of proteins
  - what structures change and what structure does not change after denaturation
  - know a few denaturation conditions