

Review for Test #2
Ch 106, 5/19/03

Chapter 15. Chirality

- Be able to identify stereocenters in a molecule
- Be able to determine whether a molecule is chiral or achiral
 - 1 stereocenter: chiral
 - 2 or more stereocenters
 - achiral if there exists a plane of symmetry
 - chiral if there is NO plane of symmetry

If the two stereoisomers	The relationship between the two isomers
<ul style="list-style-type: none">• are mirror images of each other• and the molecule is chiral	Enantiomers
<ul style="list-style-type: none">• have more than 1 stereocenter• the molecule is chiral• and the two isomers are NOT mirror image of each other	Diastereomers

- Optical activity
 - Only chiral molecules are optically active.
 - Concept of specific rotation. If one enantiomer is (+), the other will be (-).
 - Concept of racemic mixture. A racemic mixture will have a specific rotation of 0.

Chapter 19. Carbohydrates

- Classification
 - monosaccharides, disaccharides, polysaccharides
- Nomenclature of monosaccharides
 - name monosaccharides in general terms such as aldohexose, ketopentose etc.
 - D, L definitions
- Stereochemistry
 - be able to identify stereocenters
 - the concept of anomeric carbon, 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
 - the concept
 - *via* open-chain conformation
 - glycosides (ie acetals) cannot mutarotate
- Extremely soluble in water due to the presence of multiple –OH groups
- Reactions
 - with alcohols to give glycosides
 - reduction to alcohols by catalytic hydrogenation, pay attention to stereochemistry after reduction
 - oxidation with Tollens' reagent
 - reducing sugars: cyclic hemiacetals of aldoses and ketoses.
 - Glycosides (acetals) are non-reducing sugars
- Disaccharides and polysaccharides
 - be able to identify the linkage between the two monosaccharides in disaccharides
 - be able to identify whether a disaccharide is reducing sugar or non-reducing sugar
 - complete hydrolysis of starch, cellulose gives D-glucose

Chapter 20. Lipids

- Triglycerides
 - definition of fatty acids
 - structure of triglycerides
 - differences between fats and oils: structure, properties
 - reactions
 - hydrogenation, partial hydrogenation
 - saponification: hydrolysis of triglycerides with a base
- waxes
 - functional group and structure
- complex lipids: focus on glycerophospholipids
 - structure
 - characteristics that make glycerophospholipids the structural components of membranes: hydrophilic head, hydrophobic tails
- steroids
 - general structure
 - cholesterol
 - structural characteristics: hydrophilic -OH and rigid, hydrophobic ring structure
 - functions of cholesterol: membrane components and precursor for the biosynthesis of other steroids
- Membranes
 - structure characteristics (lipid bilayer, fluidity which is provided by unsaturated fatty acids fraction in lipids)
 - components of membranes: complex lipids (major components), cholesterol, integral proteins, transmembrane channel proteins, peripheral proteins.
 - functions: nutrients into cells and wastes out of cells
 - modes of transport
 - passive
 - active