

CHAPTER THIRTEEN

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 13: CARBOHYDRATES

2 lectures

Carbohydrates (section 13.1)

- Understand where the name carbohydrate originates.
- Understand how photosynthesis and respiration form the carbon cycle and produce sugars.
- Draw and recognize the structure of a simple monosaccharide.
- Understand that disaccharides & polysaccharide are composed of multiple monosaccharides.
- Recognize and differentiate between monosaccharides that are either aldose or ketose.
- Be able to classify, draw and give the IUPAC name of monosaccharide composed of 4-6 carbons.

Chiral Molecules (section 13.2)

- Understand how stereoisomers (also called optical isomers) differ from structural isomers.
- Recognize whether a shape is chiral or achiral.
- Recognize when a substituted carbon produces a chiral shape.
- Know that molecules with a chiral shape are enantiomers of molecules that are their mirror image.
- Understand that enantiomers are different substances, with different chemical properties.
- Read and draw Fisher projections to express the chirality at carbon centers along a backbone.
- Understand how D and L designations are applied to enantiomers of sugars.

Monosaccharides, Structure (section 13.3-13.4)

- Know the Fisher structure and name of both enantiomers of Glucose, Galactose, and Fructose.
- Understand the kinds of foods that provide D-Glucose and D-Galactose.
- Understand what is meant by the term "lactose intolerant."
- Understand why D-Fructose is used in some foods in place of D-Glucose.
- Understand the equilibrium between open and closed forms of hexoses.
- Be able to interconvert between Haworth and Fisher structures of hexoses.
- Understand how mutarotation causes interconversion between alpha and beta Haworth structures.
- Be able to draw and name the alpha and beta isomers of D-Glucose, D-Galactose, and D-Fructose

Monosaccharides, Properties (section 13.5)

- Name and draw the acids formed from oxidation of monosaccharides w/ Benedict's reagent.
- Predict the structure and name of the alditols produced from reduction of monosaccharides.

Disaccharides (section 13.6)

- Recognize and be able to draw the structures of maltose, lactose, and sucrose.
- Identify the glycosidic bond in disaccharides.
- Know common food sources of maltose, lactose, and sucrose.

Polysaccharides (section 13.7)

- Understand that polysaccharides are polymers of monosaccharides.
- Understand the polysaccharides amylose (a straight chain) and amylopectin (a branched chain) are ways plants store glucose as starches.
- Understand the polysaccharide glycogen is how glucose is stored in animal muscles and liver.
- Understand cellulose is a straight chain polysaccharide that gives wood its structural integrity.
- Understand why some animals can digest cellulose, but humans cannot.