CARBOHYDRATE NOMENCLATURE WORKSHEET

Structural Conventions – complete #1-4 before the first carbohydrates lecture to facilitate understanding in lecture. Use chapter 25 of the McMurry text to learn this as you go. Define the terms in the vocabulary section as you go along. Look for these terms in the text first before searching online.

Vocabulary – Be familiar with these terms for the exam.

Carbohydrate	Hexose	Anomers
Monosaccharide	Fischer Projection	Epimers
Aldose	Penultimate Carbon	Furanose
Ketose	D-Monosaccharide	Pyranose
Triose	L-Monosaccharide	Glycoside
Tetrose	Hemiacetal	Glycosidic Bond
Pentose	Anomeric Carbon	

1. Draw one example of each of the following types of monosaccharides (there may be several correct answers) and indicate the number of possible stereoisomers while keeping the same D/L configuration.

   (a) D-Aldotriose (b) L-Aldotriose
   (c) L-Ketotetrose (d) L-Aldopentose
   (e) D-Ketohexose (f) L-Aldohexose

2. What is the relationship between the following monosaccarides (enantiomers, diastereomers, or epimers)? You'll find the structures of D-monosaccharides in chapter 25. You should be able to figure out the structures of the corresponding L-monosaccharides if you're paying attention to the reading! The only monosaccharide you're expected to memorize for exams is D-glucose.

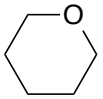
   a. D-glucose and L-glucose
   b. D-glucose and D-allose
   c. D-allose and D-altrose
   d. D-altrose and D-glucose
   e. D-glucose and D-mannose
   f. L-glucose and D-idose

3. Draw Fischer projections of the following:
   a. The C2 epimer of D-Glucose
   b. The C3 epimer of D-Glucose
   c. The C4 epimer of D-Glucose

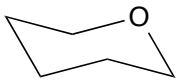
4. Monosaccharides can act as nucleophiles and/or electrophiles. Redraw any sugar from #1d and #1e and indicate the functional groups that could act as nucleophiles and those that can serve as electrophiles.

Complete, or at least attempt, #5-6 before lecture 14 using Ch 25.5 as a reference tool.

5. Redraw the following structures *exactly*. These are the backbone structures to be used for #6 of this worksheet. Pay special attention to the placement of the oxygen and the particular chair conformation used (no ring flips necessary!).



Haworth projection



Chair conformation

6. Draw Haworth projections and the chair conformation for the following aldohexoses using the backbone structures from #5. Consult Fig 25.3 of McMurry; memorize the structure of D-Glucose for the final exam.

   a. α-D-Allopyranose
   b. β-D-Allopyranose
   c. α-D-Glucopyranose
   d. β-D-Glucopyranose
   e. α-D-Idopyranose
   f. β-D-Idopyranose

Carbohydrates are an essential component in our diets, but the form and quantity of sugars we take in on a daily basis (largely due to marketing campaigns and the "deliciousness" of convenience foods) is having an adverse effect on the health of Americans. Take some time at home to research DIABETES, a disease that is affecting more and more of our population at an alarmingly increasing rate. *What is the difference between Type I and Type II diabetes and what can we do to decrease our risk factors?*