NOTES: Thus far we've reviewed a few topics and discussed some carbohydrate chemistry. The class is responsible for the materials covered in class through today's lecture. Best advice - study your notes, work the problems I make up and post on the web, check your solutions vs those handed out, and finally, use the index in your text to determine the page/section that discusses a particular topic that was discussed in class. Topics to look up might be, as an example, anomer, anomeric center, furanose, glucoside, mutarotation, Fischer projection, conjugate addition, Grignard reagent, conjugation, etc. Use of this approach should serve you well.

RDL

Problem set 3

1. Draw the chair form of α-D-glucopyranose.

2. Do the same for the natural forms of D-mannose and D-galactose.

3. Circle the term or terms that describe the relationship between D-glucose and D-mannose.
   [a] epimer
   [b] diastereomer
   [c] enantiomer
   [d] conformer
   [e] anomer

4. Provide a detailed mechanism to account for the following transformations:
   
   \[
   \begin{align*}
   &\text{[a]} & \text{[b]} \\
   &\text{H}^+ & \text{Br}_2, \text{CCl}_4 \\
   &\text{H} & \text{meso-3,4-dibromohexane} \\
   &\text{cat} & \\
   \end{align*}
   \]

5. [a] Draw the furanose form for A. A, of course, is illustrated in its pyranose form. Be certain that you preserve the absolute configuration at the asymmetric center (aka the center of chirality).
   [b] What is the absolute configuration at that center?

6. [i] Given that the structure illustrated below is that of D-mannose, formulate the structure of D-galactose.
[ii] What term(s) describe D-mannose?
[a] an alditol
[b] a ketone
[c] a glycoside
[d] an aldose
[e] an aldohexose

7. Complete the following reactions:

8. Provide reagents that could be used to affect the following transformations - provide structures, of course.
[a] α-D-mannose to ethyl α-mannopyranoside
[b] cyclohexanone to the sodium salt of its enolate
[c] 1-pentene to 1-pentanol
9. Use the definition of Keq, and pKa to show, mathematically, that Keq =

\[ A + BH \rightleftharpoons AH + B \]

\[ Ka(BH)/Ka(AH) \]. Use the equilibrium expression shown below.