

Exam 2 Practice Worksheet

Purpose: The purpose of this assignment is to apply the concepts of chemical reactions and carbohydrates. This practice assignment will help to increase your familiarity with reactions involving organic compounds, simple carbohydrates, and complex carbohydrates.

Student Learning Outcomes addressed in this assignment:

After completing this worksheet, you will be able to:

- predict products of alkene addition reactions.
- construct products of condensation and hydrolysis reactions.
- recognize oxidation and reduction reactions.
- classify types of carbohydrates.
- identify chemical structures of common monosaccharides.
- compare stereoisomers of monosaccharides.

Assignment: Complete the problems.

Criteria: This worksheet is optional and not worth a grade.

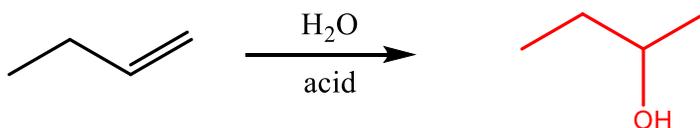
1. What is the molecular formula of an aldopentose? **C₅H₁₀O₅**

2. D-glucose and L-glucose are **enantiomers**.

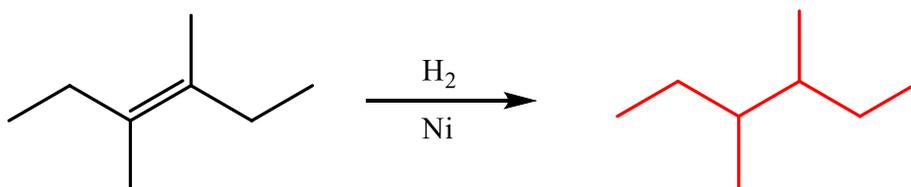
3. Glucose has **four (4)** chiral carbons.

4. Draw the major product(s) of the following chemical reactions:

a.



b.

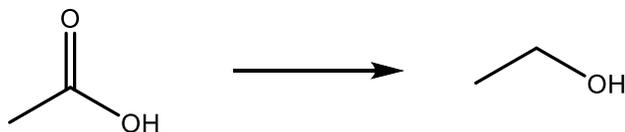


5. There are **16** stereoisomers of glucose (including D-glucose).

6. What is the monosaccharide that results from the complete hydrolysis of amylose?

α -D-glucose

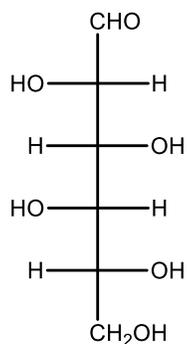
7. Indicate whether the following represents oxidation or reduction.



reduction

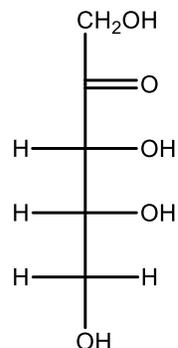
8. Classify the following based on the composition and indicate whether it is a D or L sugar.

a.



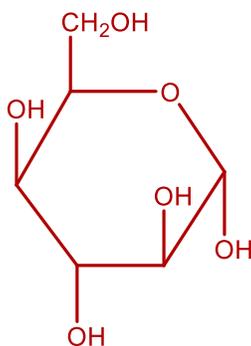
aldohexose
D-sugar

b.

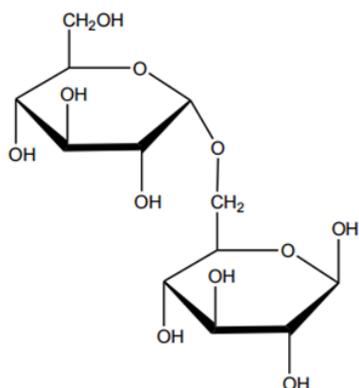


ketopentose
D-sugar

9. Draw the structure of the alpha anomer of the molecule shown in problem 8a.



10. Use the structure of the disaccharide shown below to answer the questions that follow:



a. Which monosaccharides are present? Indicate the α/β designation and list from top to bottom.

top **α -D-glucose**

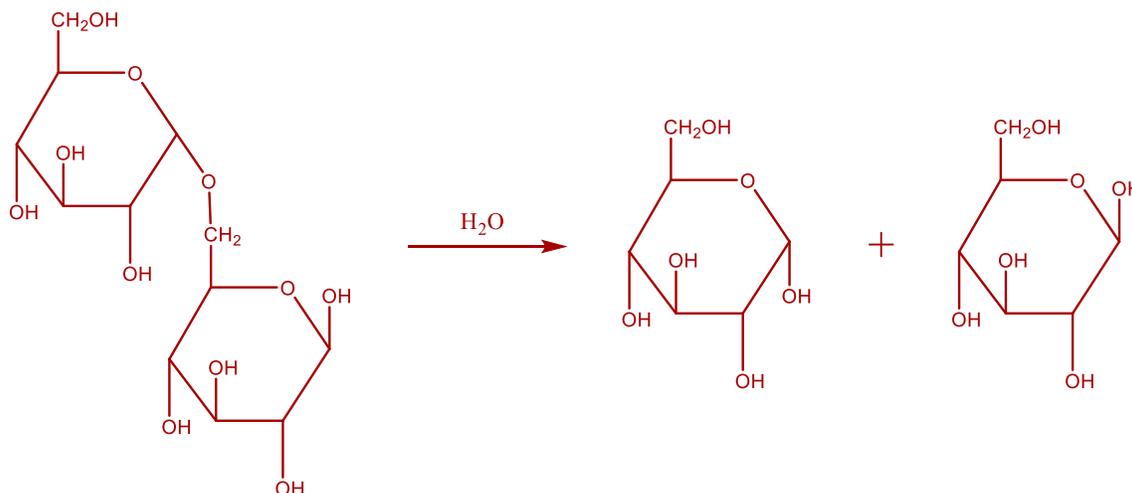
bottom **β -D-glucose**

b. Name the glycosidic linkage present in the molecule.

$\alpha(1\rightarrow6)$

c. Is this a reducing sugar? Explain. **Yes, because it has a free anomeric carbon.**

d. Show the hydrolysis reaction that occurs with this carbohydrate.



11. Provide the chemical equation for the reaction of propanoic acid with 2-butanol.

