Name _____ Test 3 (4/23)
CHEM 0313 (Biochem) Spring 2025

1. (10 pts.) Fructose is a classified as a ketose, whereas glucose is classified as an aldose. What features of fructose and glucose make the ketoses and aldoses, respectively.

1. _____

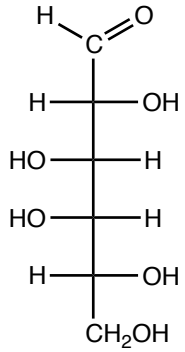
2. _____

3. _____

4. _____

2. The linear form of D-galactose is drawn below. (**a. 6 pts.**) Draw the α-pyranose form of D-galactose. (**b. 4 pts.**) In both the linear and ring versions circle the anomeric carbon atom. (**c. 4 pts.**) On the linear version circle the O atom that acts as the nucleophile and become part of the pyranose ring.

5. _____



D-galactose

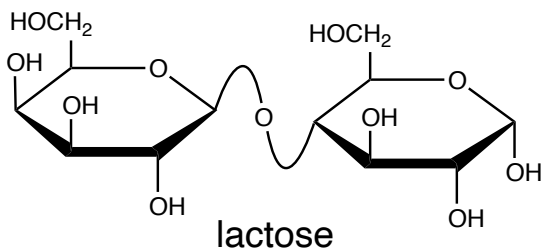
6. _____

7. _____

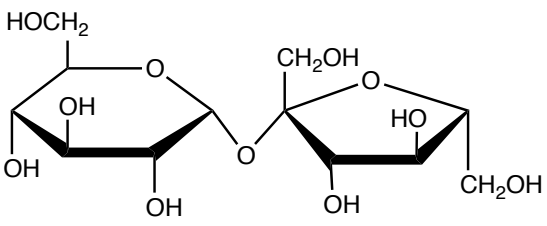
8. _____

9. _____

3. (8 pts.) Lactose and sucrose are drawn below. Briefly explain why lactose is more prone to oxidation than sucrose. (Hint: to be oxidized the sugar must open to its acyclic form.)

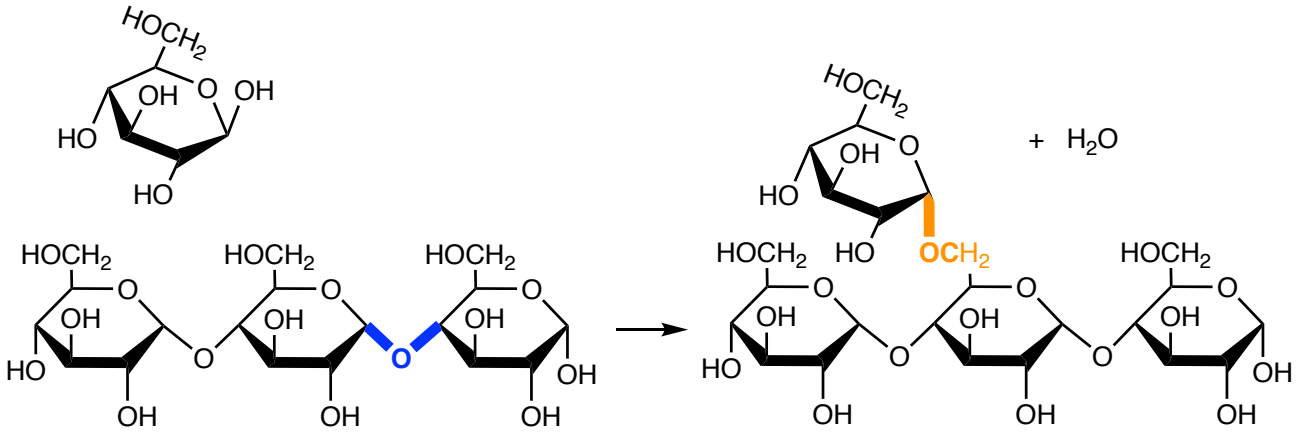


lactose



sucrose

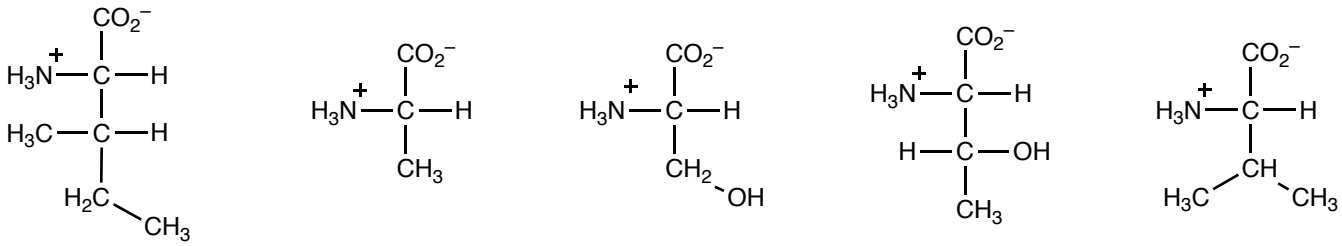
4. Part of a polysaccharide is drawn below. (**a. 8 pts.**) On the reactants indicate which atom plays the role of the electrophile and which plays the role of the nucleophile.



c. (3 pts.) Describe the linkage that is highlighted in blue … for example is it a β-2,4; α 3,6; etc linkage?

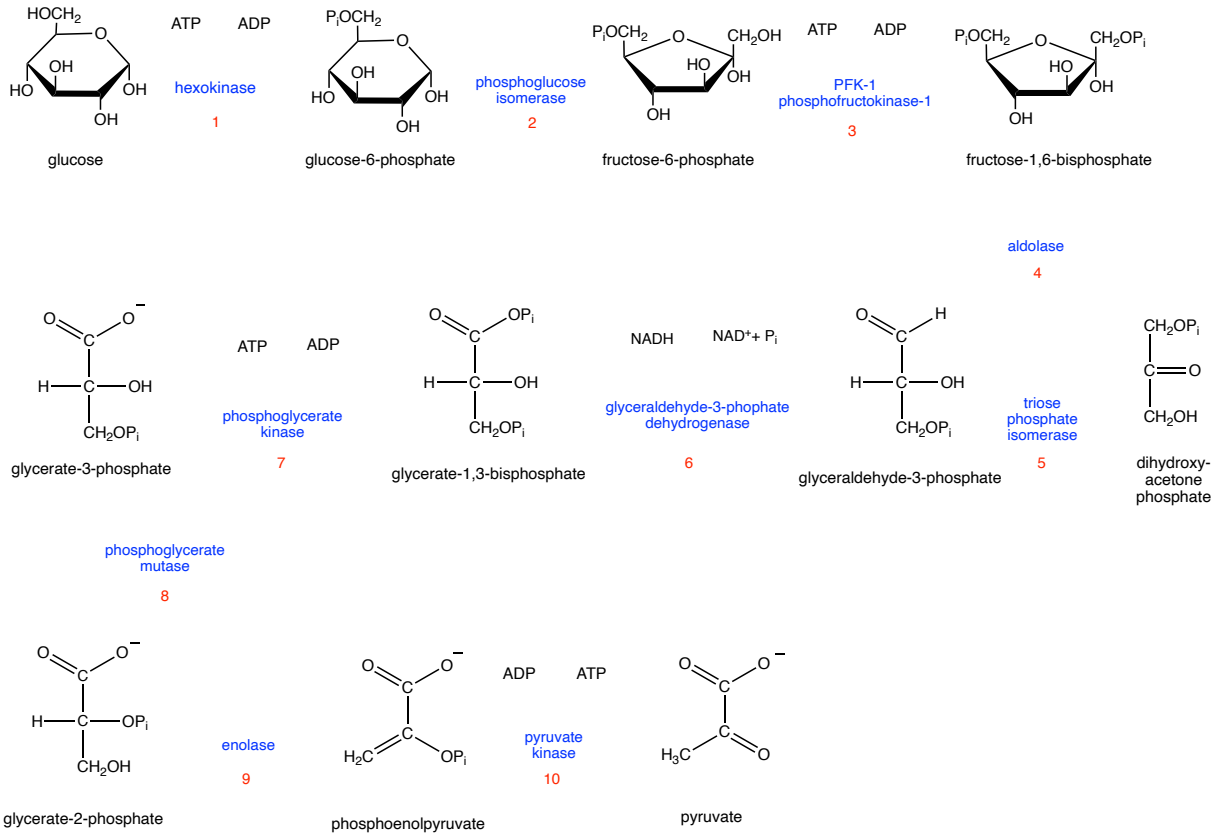
b. (3 pts.) Describe the linkage that is highlighted in orange … for example is it a β-2,4; α 3,6; etc linkage?

5. a. (5 pts.) Circle the amino acids drawn below that have side chains that would be able to form glycosidic linkages with sugars, and (**b. 5 pts.**) circle the atom that would form the bond to the sugar.



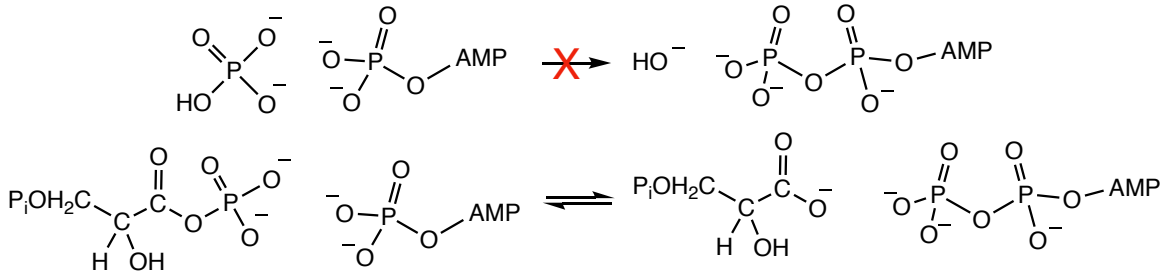
6. (10 pts.) In step five of glycolysis, dihydroxyacetone phosphate is converted to glyceraldehyde-3-phosphate. Draw the enediol intermediate involved in this conversion.

7. The steps of glycolysis are drawn below. (**a. 10 pts.**) Draw the appropriate reaction arrows (⇌ or →) linking the reactants to the product in each step.



b. (4 pts.) At which step is the sugar oxidized and what coenzyme is involved?

8. (10 pts.) ADP doesn't react with free phosphate to form ATP, but ADP can react with glycerate-1,3-bisphosphate to make ATP. Briefly explain why the first reaction fails and the second succeeds



9. (10 pts.) In the last step of gluconeogenesis in the liver, glucose-6-phosphate is dephosphorylated and glucose is released into the bloodstream. Identify which of the following reactions is the final reaction in gluconeogenesis and briefly explain why one reaction is favored over the other.