Problem Set 20: Disaccharides and Polysaccharides

1. Label the following carbohydrates as monosaccharides, disaccharides or polysaccharides.

   a. glucose
   b. sucrose
   c. amylose
   d. maltose
   e. fructose
   f. glycogen
   g. lactose
   h. galactose

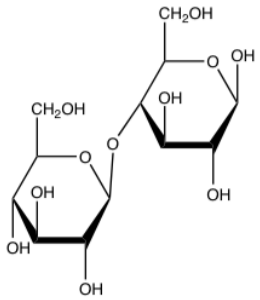
2. Cellobiose results from the breakdown of cellulose. Given the structure below for cellobiose, complete a-d below.

   a. What are the monosaccharides that are linked together in cellobiose?

   b. Circle and label any acetals, hemiacetals, and alcohols in the structure.

   c. Is the glycosidic bond oriented in the alpha or beta position?

   d. What type of linkage exists between the two monosaccharides in cellobiose?



cellobiose

3. Benedict's reagent was once used in hospitals to test for glucose in urine. Benedict's reagent contains copper (II) ions, which have a sky blue color. Upon reaction with a reducing agent, the copper (II) ions are reduced to copper (I) which forms a dark red precipitate of copper (I) oxide. Which of the following would you expect to act as a reducing agent in reaction with Benedict's reagent (in other words, which of the following would you expect to be oxidized)? Circle all that would apply.

   a. maltose
   b. sucrose
   c. galactose
   d. cellobiose

4. Amylopectin and glycogen have very similar structures. Briefly explain how these two differ structurally.

5. Which disaccharide is made up of D-galactose and D-glucose connected by a beta-1,4-glycosidic bond?

6. What two monosaccharides form from the hydrolysis of sucrose?