

(Hand-in problems must be done on separate pages & short answer questions must be typed)

1. The sweetness of honey can be attributed to β -D-fructopyranose, one of the sweetest-tasting carbohydrates known. However, cooking with honey can be problematic because honey can lose some of its sweetness after being heated. Sucrose (table sugar) retains relatively constant sweetness upon heating. Explain these differing phenomena.
2. Biochemists often synthesize custom biopolymers for research. Proteins and nucleic acids, for instance, can be synthesized using solid phase synthesis. Why are custom, synthetic polysaccharides so much less available as research tools?
3. Identify (by structure and chemical name) the disaccharide that, a) yields only D-glucose upon complete hydrolysis, b) can be hydrolyzed by α -glucosidase but not β -glucosidase, and c) does not reduce Cu^{2+} to Cu^+ .
4. Compounds containing hydroxyl groups on adjacent carbon atoms are susceptible to C-C bond cleave when treated with the periodate ion.
 - a. Sketch the mechanism (*i.e.* electron pushing) of this periodate cleavage reaction.
 - b. How can this reaction be used to distinguish pyranosides from furanosides?