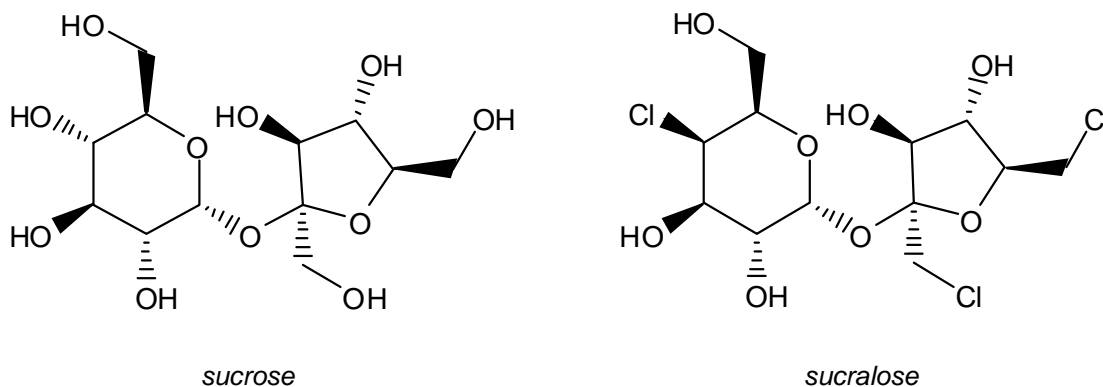


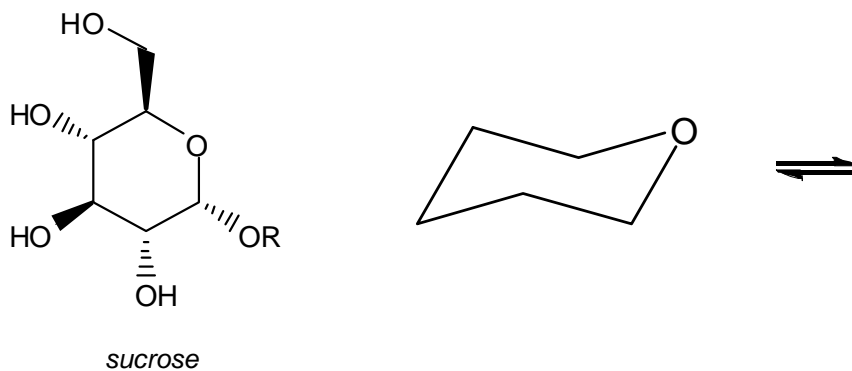
Workshop 8 Cyclohexane Conformers, and Sweetness

Sucralose (marketed as Splenda by Tate & Lyle) is a chlorinated sugar that mimics the three-dimensional structure of sucrose, and tastes even sweeter than sucrose. The chlorines prevent sucralose from being metabolized by the body, making it a no-calorie sucrose substitute.



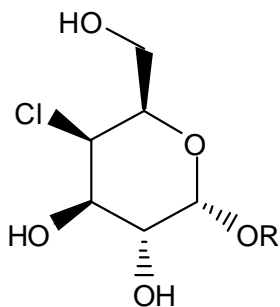
This workshop addresses the three-dimensional structures and preferred conformations of each of these two molecules. We'll be considering the conformations of the six-membered and five-membered rings separately, and then we'll put the rings together to look at the whole molecule.

- a) Starting with sucrose: One of the two possible chair conformers of sucrose's six-membered ring is shown below. Draw the other chair conformer (by "flipping" the chair), and then add the ring substituents in their appropriate axial and equatorial positions.



- b) Which of these conformations do you think is more stable?

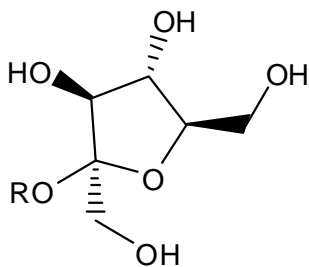
- c) Now draw two chair conformers for sucralose. How is sucralose similar to/different from sucrose?



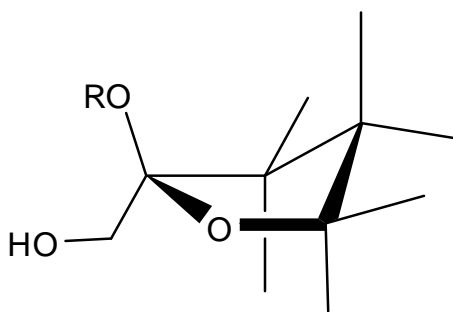
sucralose

- d) We discussed in class that cyclopentane rings are like envelopes, with a flat side and a “flap” side. In a way, the flap is like the head or foot of a cyclohexane chair, in that it can go up or down. Just as in cyclohexane, the flap also has “axial-like” and “equatorial-like” substituents.

I've drawn the framework of one of the two cyclopentane conformers of sucrose below. Fill in the appropriate substituents, and consider which are “axial-like” and which are “equatorial-like”. Then, flip the flap, and draw the other cyclopentane conformer of sucrose. Which would be more stable?



sucrose



- e) How would sucralose's five-membered ring compare to this?