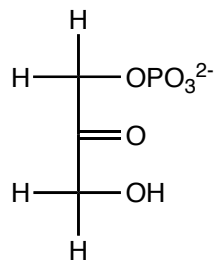


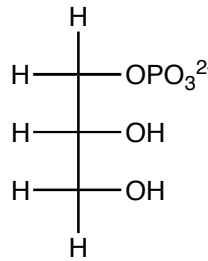
1. a. (4 pts.) Mark the chiral centers on the following molecules with a star (*).

b. (4 pts) Identify the chiral molecules, and identify any meso complexes.

i.



ii.



1. _____

2. _____

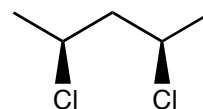
3. _____

4. _____

iii.



iv.

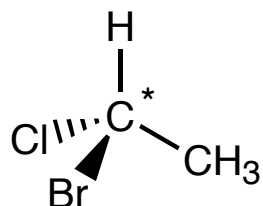


5. _____

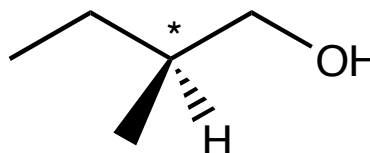
6. _____

2. (12 pts.) Determine the configuration of the starred chiral centers on the following molecules.

a.



b.



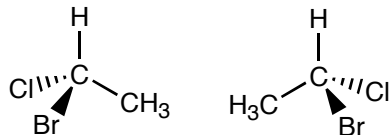
7. _____

8. _____

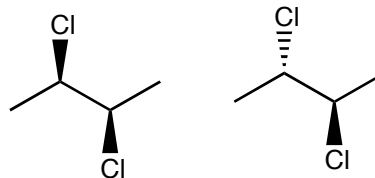
9. _____

3. (8 pts.) For each pair of molecules drawn below, determine whether the pair of molecules are enantiomers of each other, diastereomers of each other, or simply different views of the same molecule.

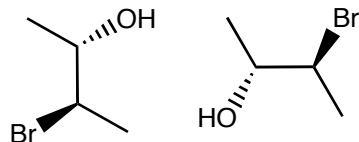
a.



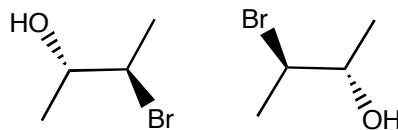
b.



c.



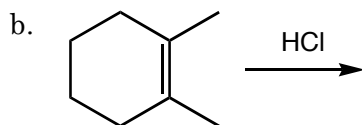
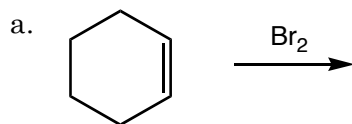
d.



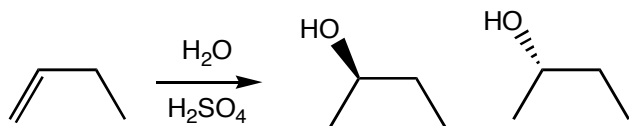
4. (8 pts.) Draw a wedge (◼) and dash (⋯) 3-D skeletal structures for the following molecule.

(2*R*,3*S*)-2-bromo-3-chloropentane

5. (6 pts. each) Predict the product(s) for each of the following reactions. Remember to indicate the stereochemistry of the product(s) by drawing wedge (◼) and dash (⋯) 3-D skeletal structures.



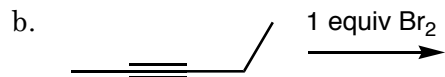
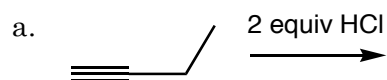
6. a. (6 pts.) Draw the intermediate that forms during the following reaction.



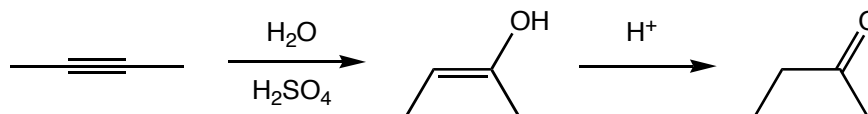
b. (6 pts.) Explain why this reaction produces a 50/50 mixture of *R* and *S* 2-butanol.

7. Using the hybridization model of bonding that we've been using all semester, (a. 6 pts.) describe the orbitals used to form an alkyne, and (b. 4 pts.) explain why alkynes are nucleophilic.

8. (6 pts. each) Predict the product(s) for each of the following reactions (ignore stereochemistry).



9. The reaction of an alkyne with water and an acid catalyst initially proceeds like other electrophilic addition reactions, but the enol product rapidly tautomerizes to the carbonyl in the presence of the acid catalyst.



(8 pts.) Draw a mechanism for the conversion of the enol to the carbonyl.

10. (8 pts.) Adding 1 equivalent of Br_2 or Cl_2 across a triple bond is relatively easy to do; however, adding 1 equivalent of H_2 across a triple bond (thus forming an alkene) is more difficult to do. Explain why it's easier to stop the electrophilic addition at the alkene stage than it is to stop the reduction at the alkene stage.