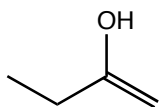


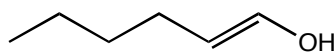
1. (8 pts. ea.) Describe the orbitals used in forming the triple bond in 2-butyne; that is, $\text{H}_3\text{C}-\text{C}\equiv\text{C}-\text{CH}_3$
- a. What is the hybridization of the two carbons involved in the triple bond? 1. _____
2. _____
- b. What how many σ -bonds and how many π -bonds join the two carbons in the triple bond? 3. _____
- c. What atomic orbitals are used to form the π -bond(s)? 4. _____
5. _____
2. a. (8 pts.) The addition of Cl_2 to an alkyne occurs by a syn or an anti addition? 6. _____
- b. (8 pts.) Draw the intermediate in the reaction of Cl_2 with an alkyne and explain why the reaction occurs as you predict in question 2.a. 7. _____
8. _____
3. a. (8 pts.) In the presence of peroxide, the reaction of HBr and 2-butyne produces *Z*- or *E*-2-bromo-2-butene or both?
- b. (8 pts.) Draw the intermediate in the reaction and explain your choice in question 3.a.
4. (8 pts.) When an alkyne reacts with HCl is the alkyne acting as a nucleophile or an electrophile?

5. (8 pts. ea.) Two enols are drawn below. Draw the carbonyl tautomers for the enols drawn below.

a.

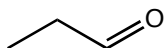


b.

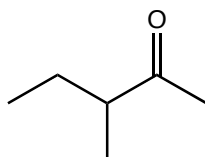


6. (12 pts. ea.) List the reagents and the alkyne that you would use to make the following carbonyls.

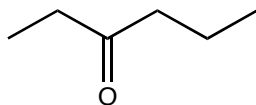
a.



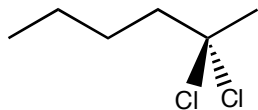
b.



c.



7. (12 pts.) List the reagents and alkyne that you would use to make the following molecule. The reaction can be accomplished in one step.



8. (12 pts. ea.) Starting from acetylene ($\text{HC}\equiv\text{CH}$) and any other reagents that you need, make the following molecules.

