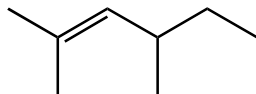


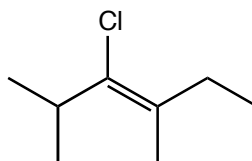
1. (6 pts. ea.) Provide IUPAC names for the following structures. Use the Z/E nomenclature where appropriate.

1. _____

a.



b.



2. _____

3. _____

4. _____

2. (10 pts.) Determine whether the following ions/atoms/molecules are nucleophilic, electrophilic, or neither.

5. _____

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$	H_2	HCl	Br_2	I^-
CH_3OH				H_2SO_4

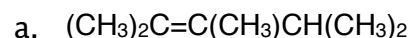
6. _____

7. _____

8. _____

3. (10 pts.) Draw a 3-D representation of the following molecules. Use wedges (▴) and dashes (▾) where appropriate.

9. _____



4. (10 pts.) Explain why alkenes are more reactive than alkanes. Include in your explanation (1) a description (include the names) of the orbitals used to form the C-C bond in an alkane, and (2) a description (include the names) of the orbitals used to form the C=C bonds in an alkene.

5. A reaction coordinate diagram for an electrophilic addition to an alkene (a electrophilic addition that we have not studied in class yet) is drawn below.

a. (2 pts.) How many steps does this reaction have?

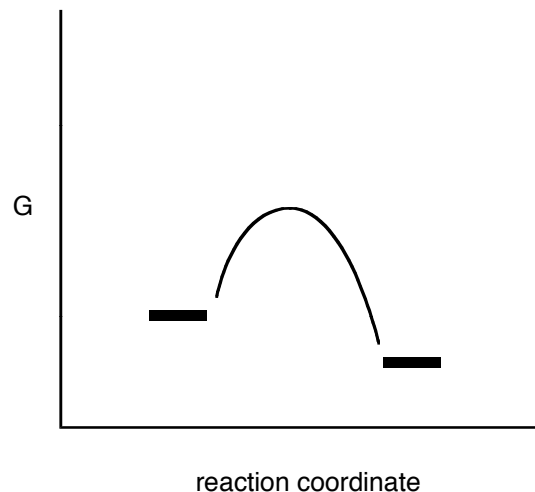
b. (2 pts.) Does this reaction go through an intermediate? If it does, label the position that represents the energy of the intermediate on the graph.

c. (2 pts.) Does this reaction go through a transition state? If it does, label the position that represents the energy of the transition state.

d. (2 pts.) What is the sign of the ΔG for this reaction?

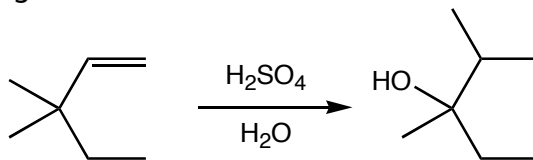
e. (2 pts.) Would this reaction have a large or small K ?

f. (2 pts.) Based on the information presented in the reaction coordinate diagram, would this reaction be prone to carbocation rearrangements? Briefly explain your response.

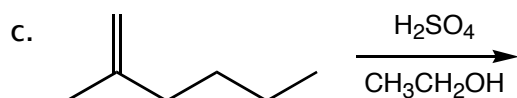
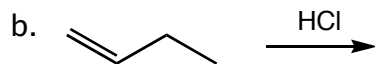
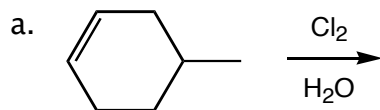


6. a. (4 pts.) What is the role of the sulfuric acid in the reaction drawn in part b?

b. (8 pts.) Propose a mechanism that accounts for the production of 2,3-dimethyl-3-pentanol in the following reaction.

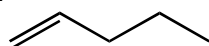


7. (6 pts. each) Predict the major product(s) of the following reactions. Consider only the organic products.

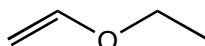


8. (10 pts.) Explain why Cl_2 and Br_2 initiated electrophilic addition reactions don't undergo carbocation rearrangements.

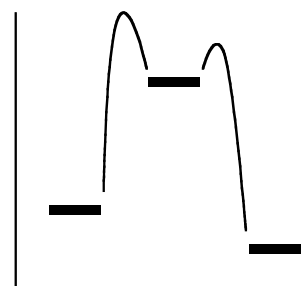
9. (10 pts.) A chemist noticed that the electrophilic addition of HCl across the alkene of 1-ethoxyethene occurs more quickly than the reaction of HCl with 1-pentene. Provide an explanation for this observation.



less reactive



more reactive



a generic reaction coordinate diagram for an electrophilic addition of HCl across an alkene