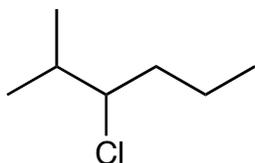
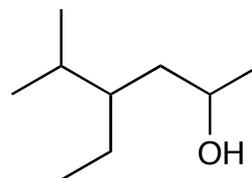


1. (3 pts. ea.) Provide names for the following molecules (use IUPAC nomenclature).

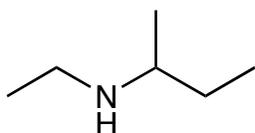
a. \_\_\_\_\_



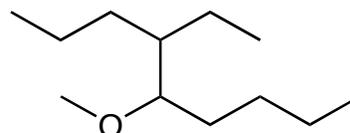
b. \_\_\_\_\_



c. \_\_\_\_\_

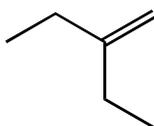


d. \_\_\_\_\_

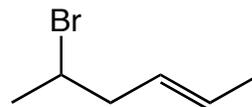


2. (3 pts. ea.) Provide names for the following molecules using *Z* or *E* designations where appropriate (use IUPAC nomenclature).

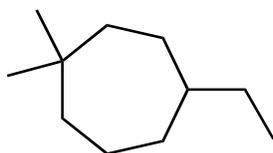
a. \_\_\_\_\_



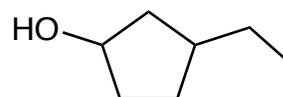
b. \_\_\_\_\_



c. \_\_\_\_\_



d. \_\_\_\_\_



3. (8 pts.) As demonstrated in the following balanced equation, HBr reacts with propene to form 2-bromopropane. Draw a mechanism for the electrophilic addition of HBr to propene.



4. (4 pts. ea.) Draw skeletal structures of the lowest energy conformation of following molecules.
- a. *trans*-1-ethyl-3-methylcyclohexane                      b. *trans*-1,4-dimethylcyclohexane

5. (8 pts) Draw Newman projections, looking down the 2–3 bond, for the lowest and highest energy forms of butane (include unstable forms when considering what is the highest energy form).

6. (2 pts. ea.) Label each of the following as a nucleophile or an electrophile.

a.  $\text{H}^+$



c.  $\text{Br}^-$

d.  $\text{HCl}$



f.  $\text{H}_2\text{SO}_4$

7. (3 pts. ea.) Draw skeletal structures for the following molecules.

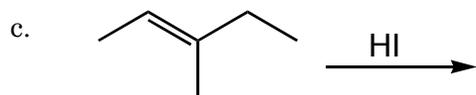
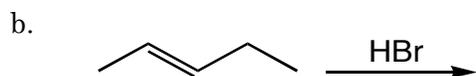
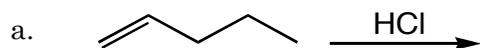
a. *N,N*-dimethyl-2-butanamine

b. 3-ethyl-2-methyl-1-heptene

c. 3-ethoxy-1-pentanol

d. 2-methyl-2-propanamine

8. (3 pts. ea.) Predict the major product(s) for each of the following reactions.

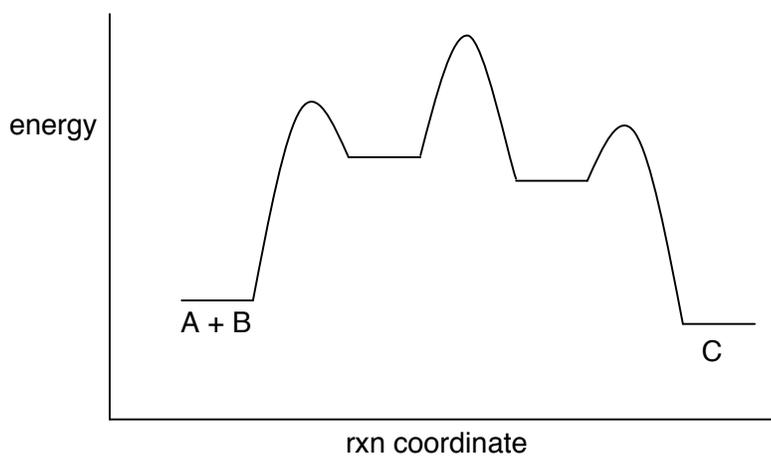


9. The following questions refer to the reaction coordinate diagram.

a. (3 pts.) How many steps does the reaction have?

b. (3 pts.) How many (if any) intermediates form during the reaction?

c. (3 pts.) Locate the transition state(s) in the reaction.



d. (2 pts.) Is  $\Delta G$  for the reaction positive or negative?

10. (8 pts.) Order the following carbocations in order of increasing stability.

