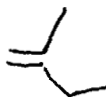
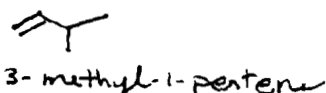


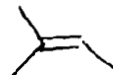
CHEM 241 IN-CLASS PROJECT #3-Turn in one sheet per group.

NAMES Bruce Jenny, Dan O'Brien

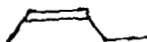
1. a. Draw and name the all alkenes which have the molecular formula C_5H_{10} . (hint: there are 6 total)



2-methyl-1-butene



2-methyl-2-butene



cis-2-pentene



trans-2-pentene

b. Which structures above would be considered 'geometric isomers' of each other.

cis & trans ~~2-butene~~ (They have the same connectivity but are different
2-pentene in space)

2. Circle the following statements about propene that are correct?

All 3 carbons lie in the same plane

The compound has cis and trans isomers

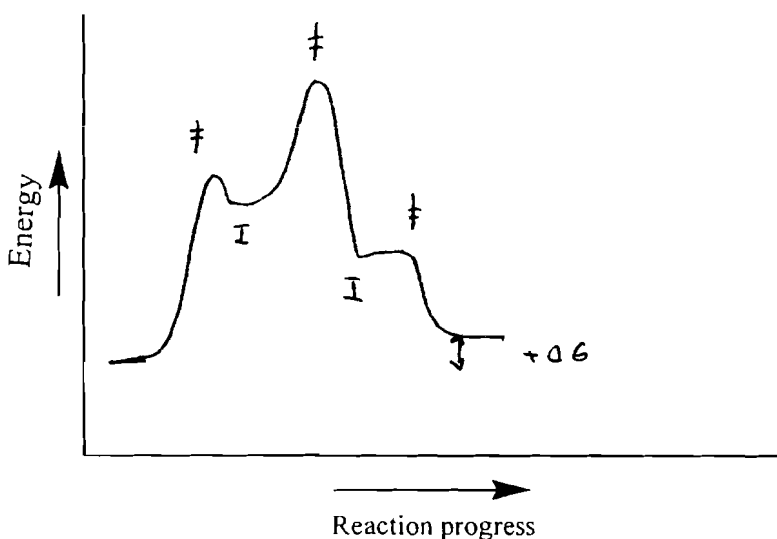
It generally acts as an electrophile

~~There are a total of 8 sigma bonds and 1 pi bond in the molecule~~

It is generally acts as a nucleophile

3. Answer the following for the reaction coordinate diagram below:

- a. How many steps are in the reaction depicted by the reaction coordinate diagram shown below? 3
- b.
- c. What is the value of the equilibrium constant (K) (greater than 1, less than 1 or 1). *more reactants, $\Delta G^\circ > 0$*
- d. Is the value of the Gibbs free energy (ΔG) positive or negative?
- e. Mark the location of the transition state(s) with an \ddagger and the location of the intermediate(s) with an 'I'.



4. Regarding the following 4 (#1-#4) reaction coordinate diagrams answer the following.

Which has the fastest rate? 3 smallest ΔG^\ddagger barrier

Which has the slowest rate? 1 Largest ΔG^\ddagger barrier

Which is the most exothermic (exergonic)? 4

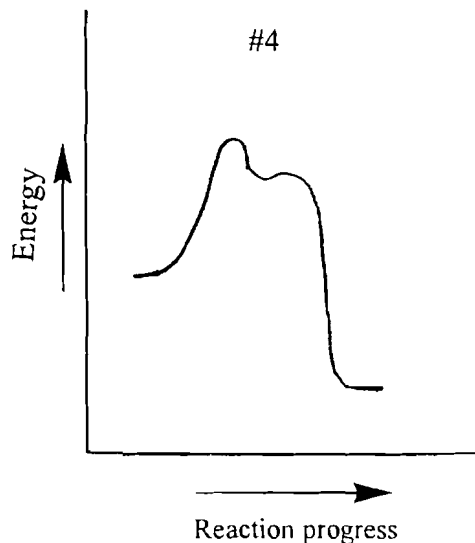
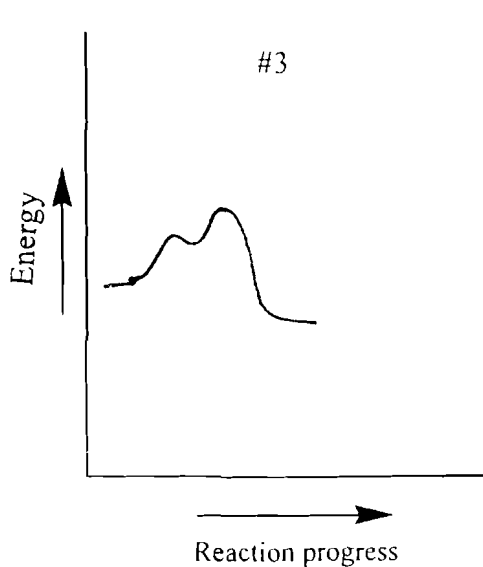
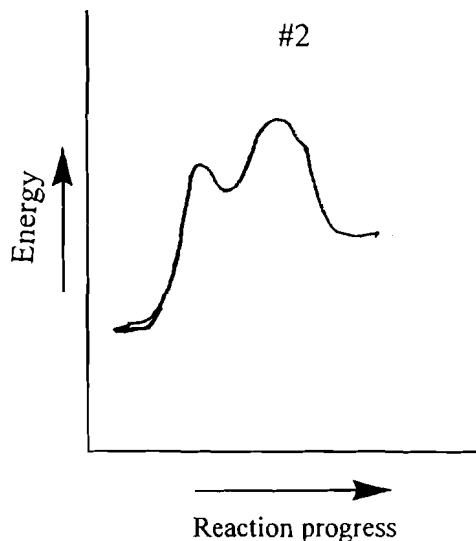
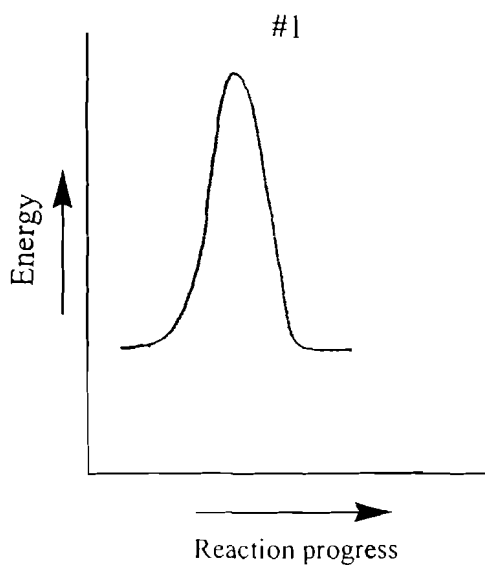
Which is the most endothermic (Endergonic)? 2

Which has the smallest **rate constant** (k) 1

Which has the largest **equilibrium constant** (K) 4 - largest $-\Delta G$

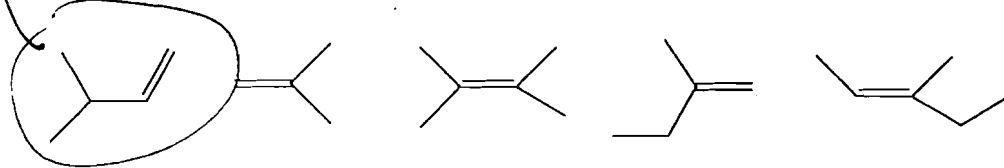
Which has the largest ^{Absolute} ΔG^\ddagger Value? 2 or 4 (close

Same

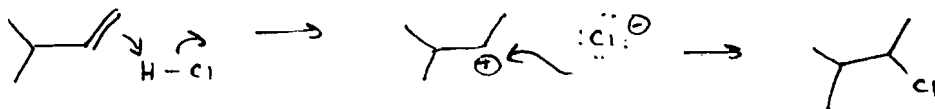


The Best it can do is form a 2° carbocation - All others can form a 3° cation

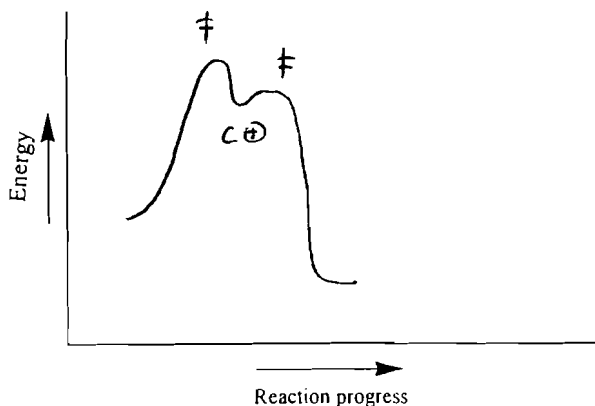
5. a) Circle the alkene below that would react with HCl at the slowest rate.



b) Draw the reaction mechanism for the reaction of HCl and the alkene you circled above. Draw the mechanism that forms the major product only. Be sure to carefully draw all arrows and show all formal charges that may arise.



c) Draw the reaction coordinate diagram for the reaction (the reaction is exothermic).



6. Draw a mechanism to explain the unexpected outcome of the reaction shown below.

