CHMY 211 EXAM #2 (CH 3-4) SPRING 2010

1. Give the IUPAC name for each of the following. (Don’t forget about geometric isomers!)

- $2,5,7$-trimethylact($3E$)-ene
- $4$-isopropyl-$5$-methylcycloalka($1,4Z$)-diene
- 3-cyclohexyl-4-propylcyclohexene

2. Assign E or Z configuration to each of the following molecules.

3. Define the terms electrophile and nucleophile. Label each of the compounds below as an electrophile or a nucleophile.

- $E^+$ is an e-picking molecule
- $Nu$ is an e-raid molecule

- $E^+$
- $Nu$ $H_2O$
- $Nu$ $H_2C=CH_2$
- $Nu$ $Cl^-$
4. Define each of the following:

a. energy of activation  \( E \) required for a reaction to occur.

b. intermediate molecule that is produced in a reaction and then used in next reaction.

c. transition state highest \( E \) state during a reaction.

d. rate determining step slowest step in a mechanism.

e. heat of reaction (enthalpy) energy difference between reactants and products.

f. exothermic reaction reaction that releases \( E \).

g. endothermic reaction reaction that requires \( E \) overall.

5. Draw a potential energy diagram of a two step reaction where the first step is exothermic, the second step is endothermic and the reaction is exothermic overall. Label the reactants (R), product (P), intermediate (I), transition states (TS), energies of activation (\( E_a \)) and the heat of reaction overall (\( \Delta H \)).
6. a. Give a step-by-step mechanism for the following reaction.

b. Label the electrophile and nucleophile in each step.

c. State Markovnikov's Rule. How does it effect the product of this reaction?

7. Complete the following reactions by providing the structures of the products of each.

8. Which of the reactions is a(n):

   a. Hydration B
   b. Hydrohalogenation C
   c. Halogenation D
   d. Hydrogenation A
   e. reduction A
   f. syn addition A
   g. anti addition D
   h. symmetrical addition A, D
   i. unsymmetrical addition B, C