

Chem 141
Fall 2006
Exam 4
11/15/06

NAME: _____

LECTURE SECTION
(Daytime or Evening): _____

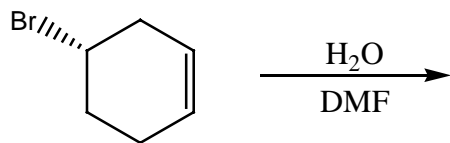
Problems	Pages	Points	Grader
_____	_____	_____	_____
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TOTAL _____ points

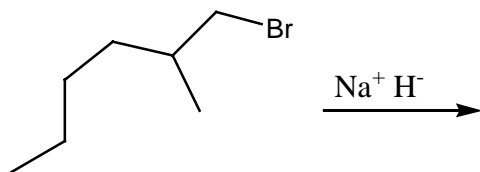
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- 1) Fill in the gaps. Add either, reactant, reagent or product for the following reactions. Name the starting material and the product. (4 points each)

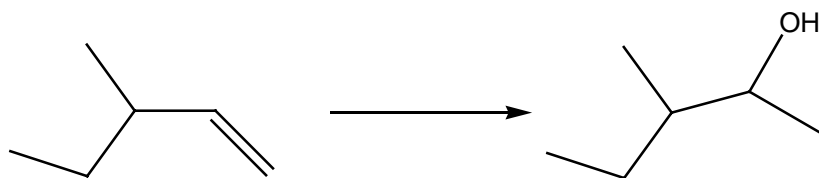
a)



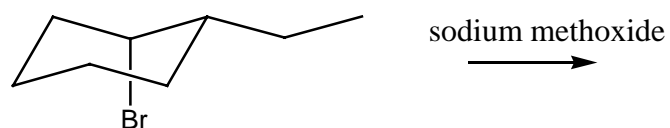
b)



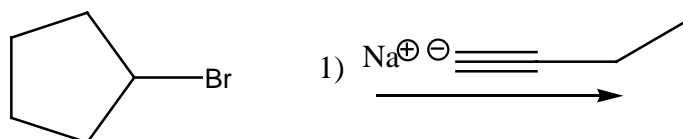
c)



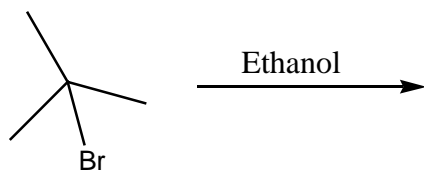
d)



e)

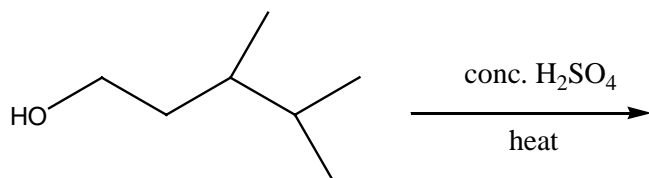


f)

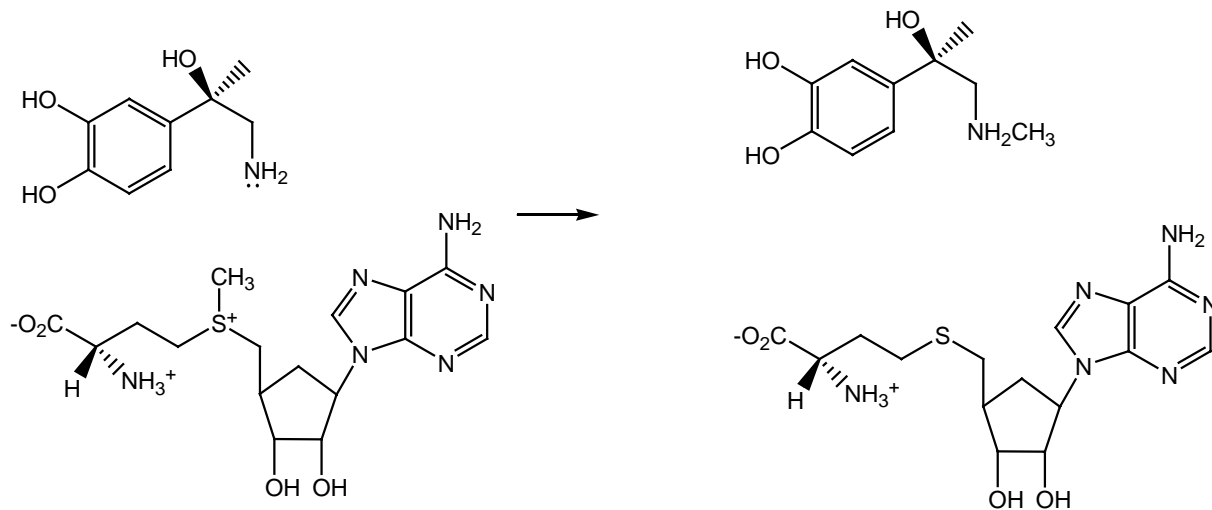


2) Define Markovnikov's Rule. The stability of which key intermediate will dictate Markovnikov's rule in the acid-catalyzed hydration of an alkene with water. Explain in a few sentences and illustrate with a concise illustration (8 points).

3) Show the full mechanism for each of the steps of the following reaction to the most stable product. Do not include transition states. (10 points)

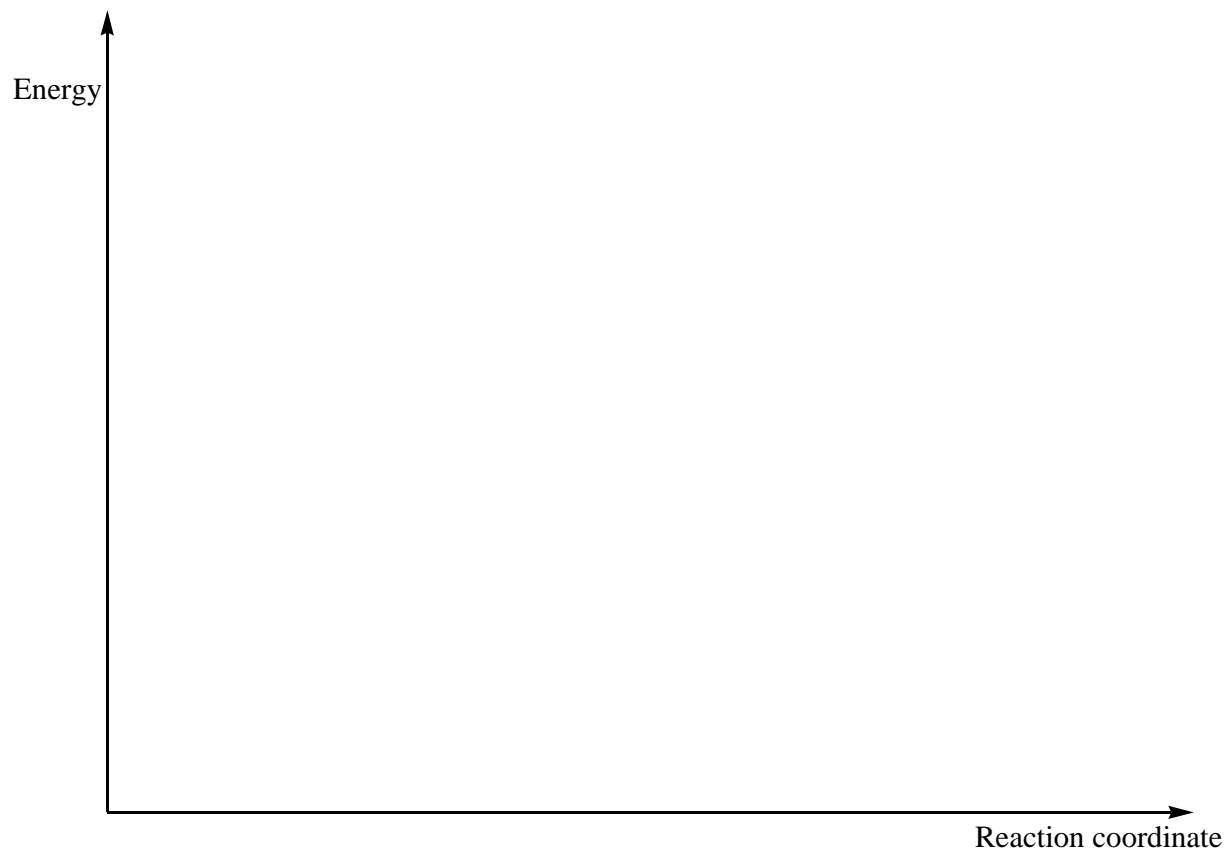
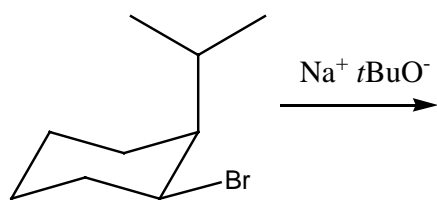


4) During the cellular synthesis of adrenaline (epinephrine) the following methylation occurs. What style of mechanism is this $\text{S}_{\text{N}}1$, $\text{S}_{\text{N}}2$, $\text{E}1$, $\text{E}2$. Add arrows to the reaction to illustrate the electron flow. Draw the charges on the relevant atoms of the products. (4 points).

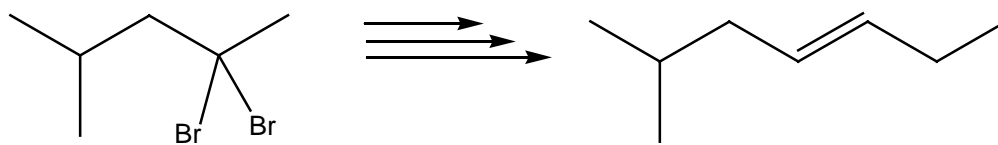


5) What is hyperconjugation and why is it useful? Include an illustration (5 points).

6) Draw in an appropriate graph to illustrate the free-energy diagram of the following reaction. Provide the structures of any intermediates and the transition states of the key transformation(s). (8 points). Assume the reaction is endergonic.



7) Design a synthesis that would allow you to transform the following starting material into the desired product. Show the intermediate formed (mechanisms are not required) (10 points)

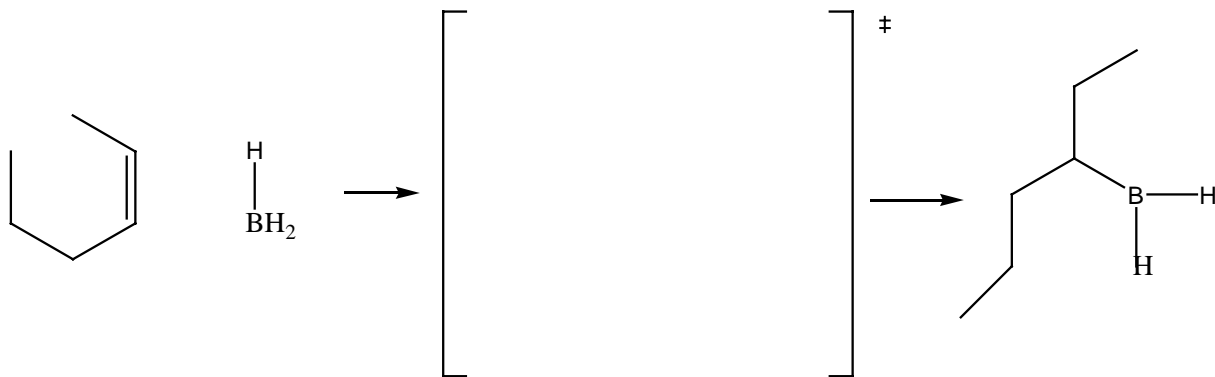


8) What is the order of stability for substituted alkenes? (4 points)

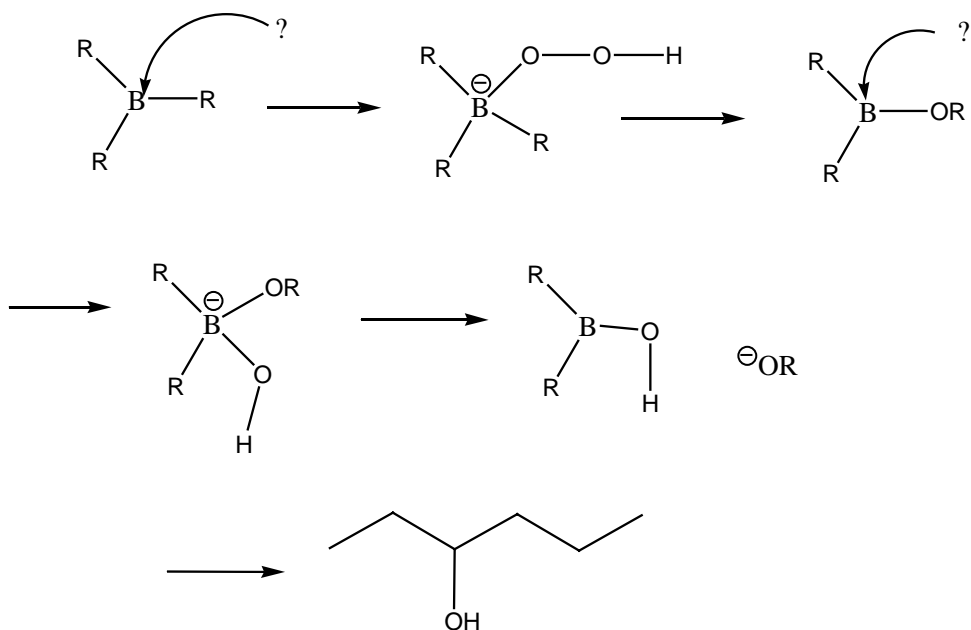
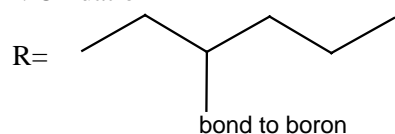
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9) During the hydroboration and oxidation of an alkene a trialkylborane is formed and subsequently oxidized. The mechanism repeats the hydroboration three times and the oxidation three times. Rather than show the whole mechanism add arrows and any additional structures (reagents or intermediates) to complete the following mechanism. (12 points)

Step 1: Hydroboration

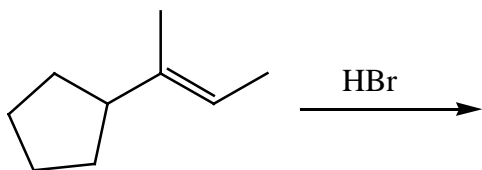


Step 2: Oxidation



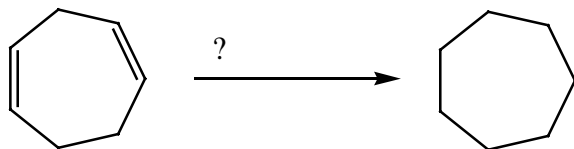
10) Define Zaitsev's rule. (3 points)

11) Provide a full mechanism for the following reaction. (7 points)

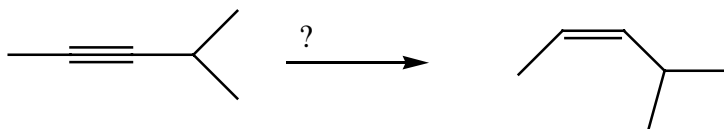


12) Provide starting material, reagents or products to complete the following reactions. (2 points each)

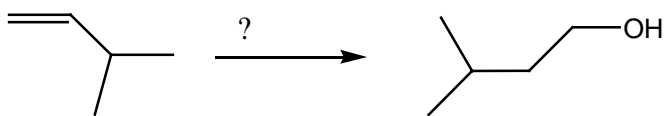
a)



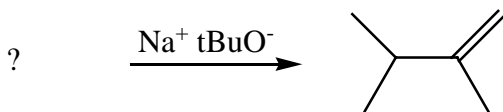
b)



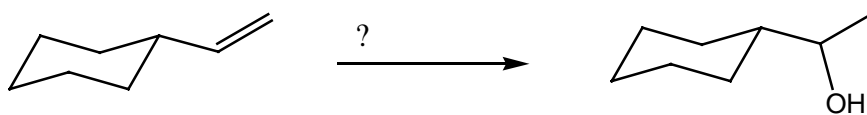
c)



d)



e)



f)

