

Chemistry 116 Sec. A (8:00-8:50)
Final Exam
“Organic Chemistry - Fall 2001”
December 19, 2000

Instructions: You have until 5:00 p.m. to complete the exam. At that time, I will request that all remaining test takers cease writing, turn their exams over, and pass them to their rightmost isle. If you finish before 4:55 p.m. you may turn in the exam at the front of the room prior to leaving. If you finish within the final 5 min. of class, please turn your exam over and remain seated until I call for the remaining exams to be turned in. *In fairness to all, anyone still working on the exam after “time” is called will receive a grade of zero!*

Be sure to read the instructions for each question. It may be helpful to skim the entire exam and solve the easier questions first.

Restroom Policy: Only one person at a time will be allowed to go to the restroom. If you need to go, bring your exam down to the front of the room and pick it up when you return.

Exam Agreement: I, _____, have read and agree to

(Please print)

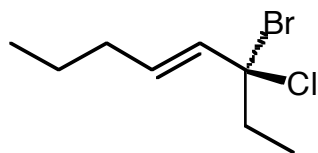
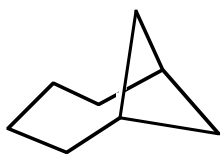
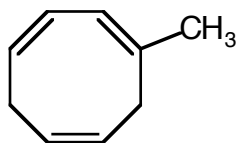
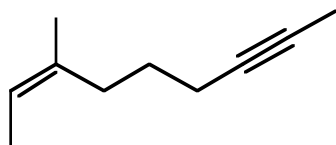
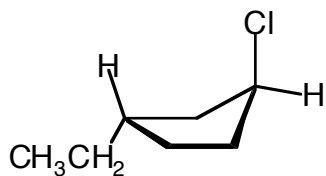
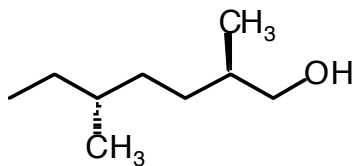
abide by the instructions above. On my honor, I have neither given nor accepted any help during this exam.

Signature: _____

College: _____

**DO NOT OPEN THIS EXAM UNTIL
INSTRUCTED TO DO SO**

1. Provide an unambiguous (IUPAC or common) name for each of the following compounds. Be sure to indicate stereochemistry where appropriate. (18 points)



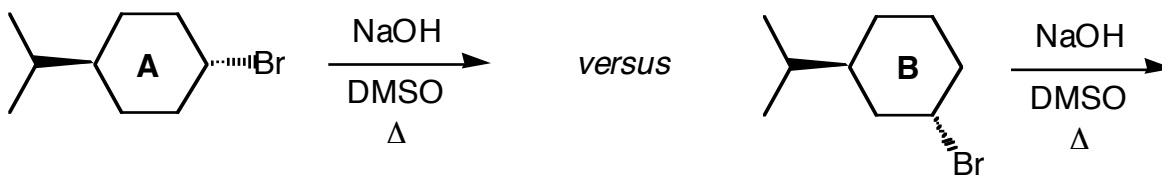
2. Fill in the boxes below. *Note: any answers outside of the boxes will not be graded.* (24 points)

	Definition	Example
<i>A meso compound</i>		
<i>A racemic mixture</i>		
<i>A Lewis Acid</i> (your example cannot also be a Brønsted-Lowry Acid)		
<i>Constitutional Isomers</i>		
<i>Dihedral Angle</i>		specify the value of the dihedral angle in your example
<i>Transition State</i>		

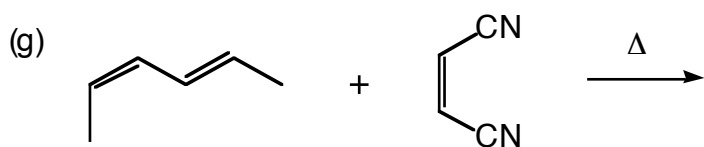
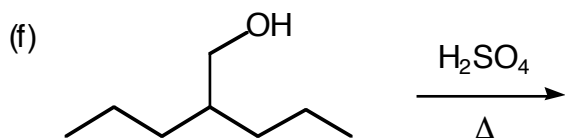
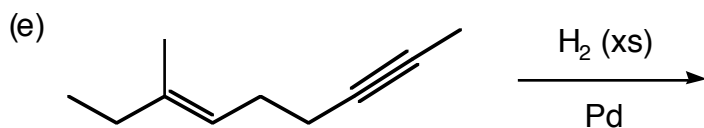
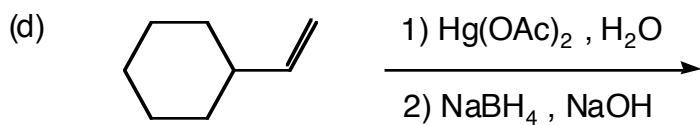
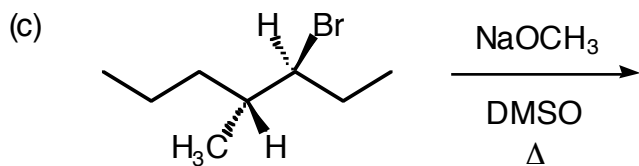
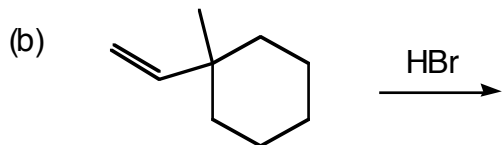
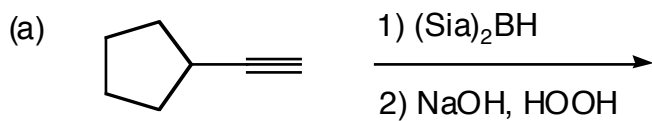
3. **A**, a molecule with the molecular formula C_8H_{16} is subjected to catalytic hydrogenation to give an achiral molecule, **B**, of molecular formula C_8H_{18} . When **A** is treated with molecular bromine in the dark, a racemic mixture of **C** ($C_8H_{16}Br_2$) is formed. Treatment of **A** with HBr, followed by refluxing with a mild base yields **D**, a stereoisomer of **A**. Provide structures for **A-D** below. (8 points)

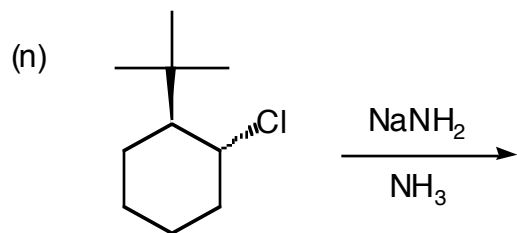
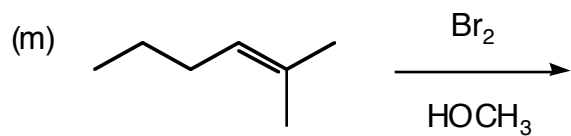
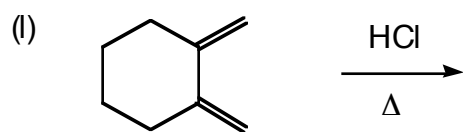
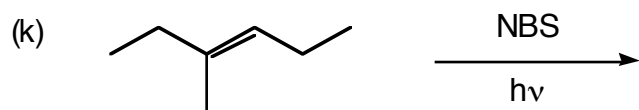
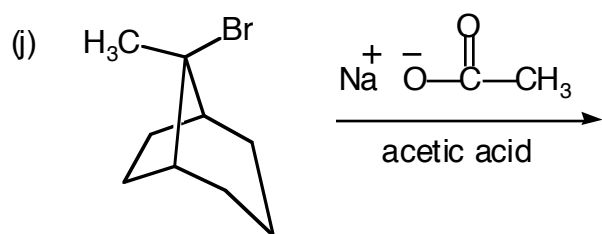
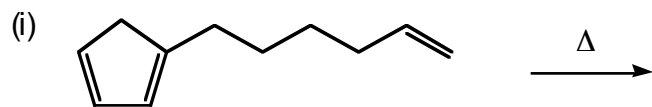
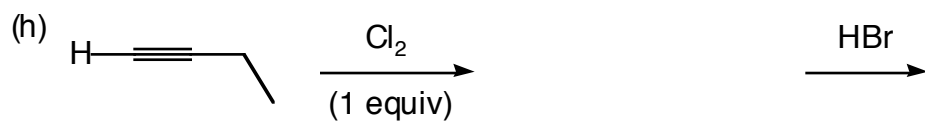
A	B
C	D

4. Determine whether **A** or **B** undergoes elimination more rapidly under the conditions shown below. Provide a rationale for your choice using both pictures *and* words. (5 points)

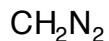


5. Draw the **major product** of each of the following reactions. *Be sure to include stereochemistry in your answers where appropriate.* (4 points each)





6. The molecule shown below is known as diazomethane:

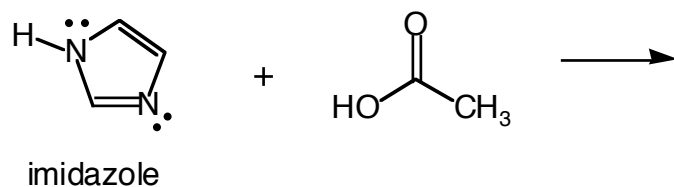


a) Draw the two most stable resonance contributors for diazomethane and rank them according to their stability (1=most stable, 2=least stable). For full credit, you must show all lone pairs of electrons and formal charges. (7 points)

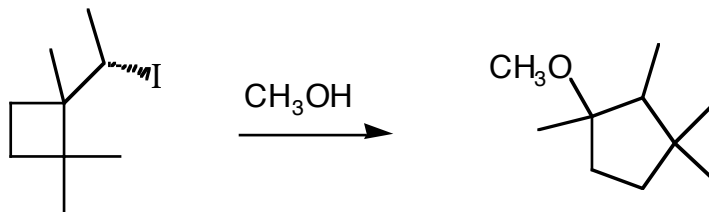
b) Diazomethane acts as a nucleophile and reacts with 2-bromopropane to produce **A**. When **A** is treated with base, the alkene shown below is formed. The second step of the reaction is also accompanied by vigorous bubbling due to the release of an unknown gas. Identify product **A** and the gas. Also, provide a mechanism for the entire reaction sequence. (8 points)



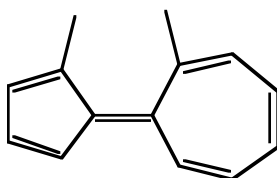
7. Imidazole will undergo an acid-base reaction with a moderately strong acid such as acetic acid. Draw the product of this reaction and explain why you chose the atom that you chose to act as the Lewis base. (6 points)



8. Propose a mechanism for the following reaction. For full credit, show the products of each step and any formal charges. Don't worry about stereochemistry here! (7 points)

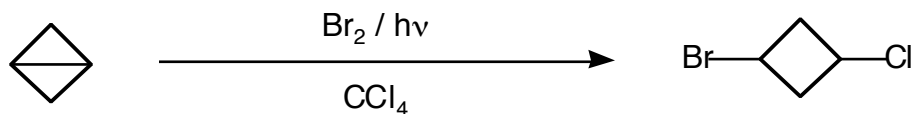


9. Explain why the molecule shown below rotates plane polarized light at room temperature. You must use words **and** pictures in your explanation. (5 points)

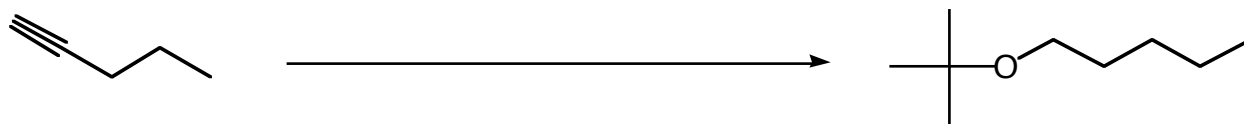
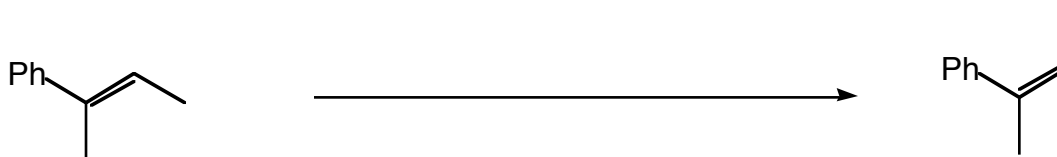
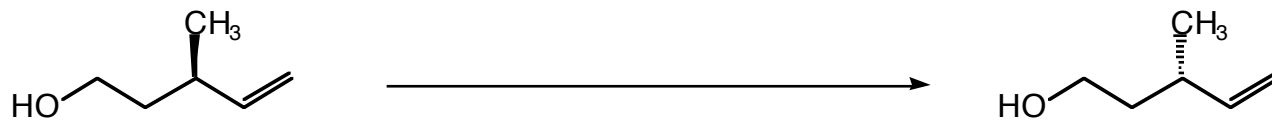


10. Read these instructions carefully before proceeding. Provide a mechanism for the following reaction, paying close attention to the following details: (8 points)

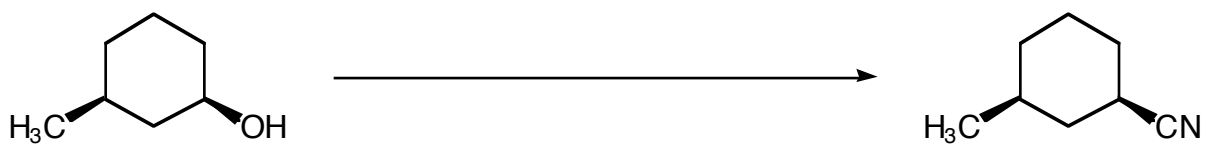
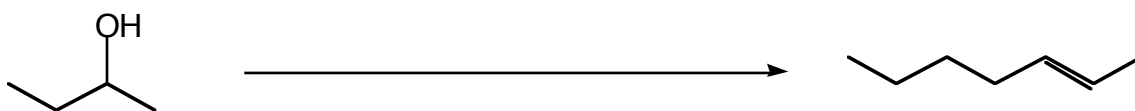
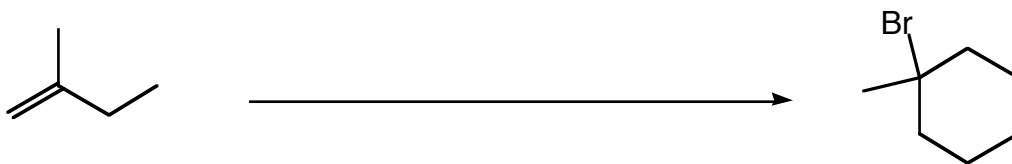
- label the three major steps of the reaction (initiation, propagation, and termination),
- include any intermediates in your mechanism, and
- provide at least 4 plausible termination steps (stereoisomeric termination steps count as one!).



11. (Choose 4 out of 6) Propose a synthesis (sequence of reactions) that will accomplish each of the following transformations. *Be sure to include the products of each step.* Clearly indicate which four you wish for me to grade. If no indication is made, I will grade the first four. (8 points each)



synthesis (cont'd)...

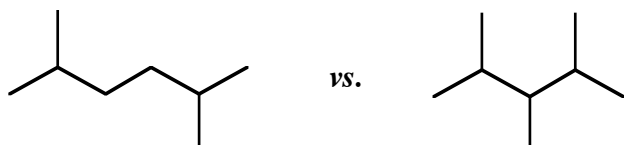


12. For each pair of molecules shown, circle the one that best fits the accompanying description and provide a concise rationale for your choice. Pictures *may* be required for full credit! (4 points each)

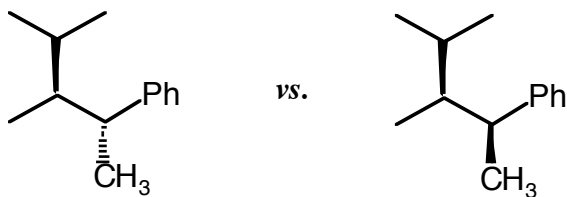
Most basic molecule



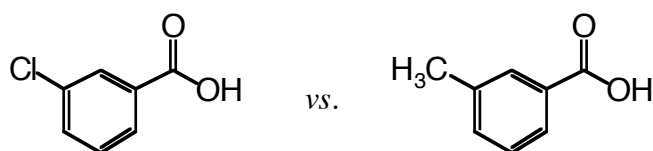
Highest boiling point



The molecule with the most stable conformer



Most acidic molecule



Grading Summary

Page	Point Value	Points Earned
2	18	
3	24	
4	13	
5	28	
6	28	
7	21	
8	12	
9	8	
10 & 11	32	
12	16	
	Total Score =	