Chemistry 116 Sec. A (8:00-8:50)
Exam No. 2
"Alkene Reactivity and Stereochemistry"
October 20, 2000

Instructions: You have until 8:55 a.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 8:50 a.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.

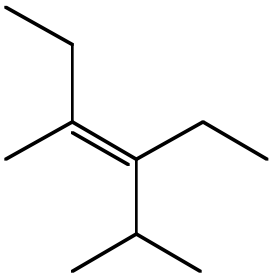
Exam Agreement: I, _____, have read and agree to
(Please print)
abide by the instructions above. On my honor, I have neither given nor accepted any help during this exam.

Signature: _____

College: _____

DO NOT OPEN THIS EXAM UNTIL INSTRUCTED TO DO SO

1) Provide an unambiguous name (IUPAC or common) for the following molecule. (8 points)



_____

2) Provide the correct structure for the following compound and answer the question that follows. (8 points)

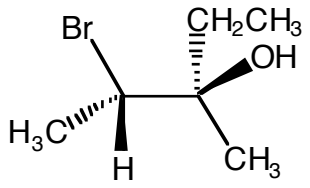
(1*R*,3*S*)-1,3-Dibromocyclohexane

Which classification *best* describes the molecule above? (Circle your answer for 4 points)

A) Chiral B) Achiral C) Meso

3) Propose a synthesis that will achieve the following transformation. (8 points)

Any alkene ⟶



+

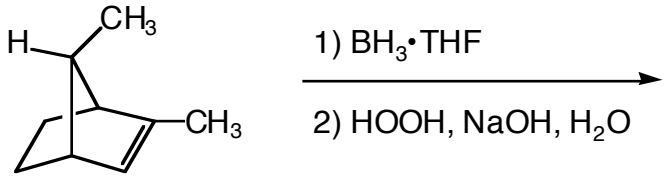
Enantiomer

4) Compound **A** is an optically inactive compound with a molecular formula of C_5H_8. Catalytic hydrogenation of **A** gives an optically inactive compound, **B** (M.F. = C_5H_{10}), as the sole product. Furthermore, reaction of **A** with HBr results in a single compound, **C**, with a molecular formula of C_5H_9Br. **C**, which is optically inactive, is also obtained when **A** is subjected to HBr in the presence of peroxide. Provide structures for **A**, **B**, and **C** below. (12 points)

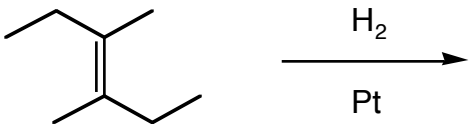
A	**B**	**C**

5) Predict the *major* product(s) for each of the following reactions and circle your final answer. Be sure to consider regiochemistry and stereochemistry in your answers. For problems where two or more products are formed in equal amounts, draw *all* of the products and circle each one. (5 points each)

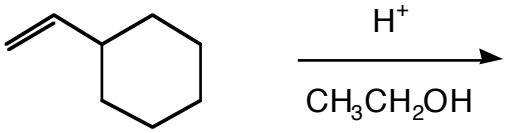
A)



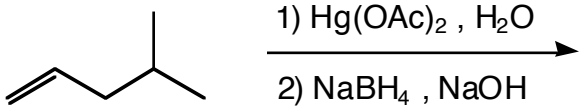
B)



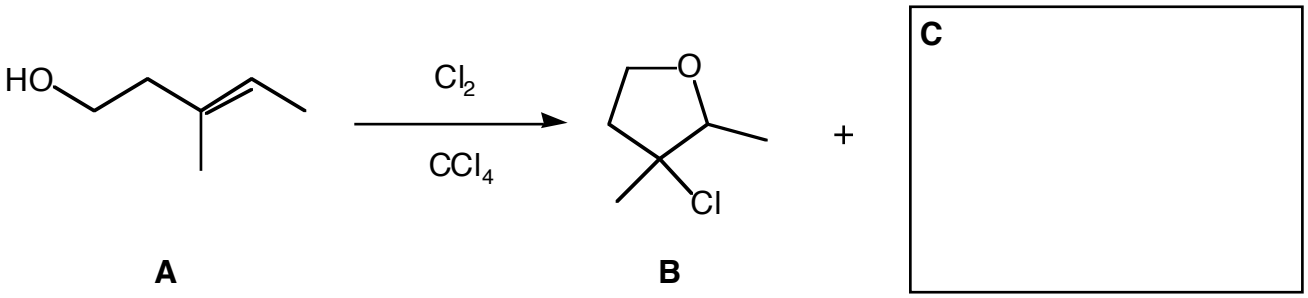
C)



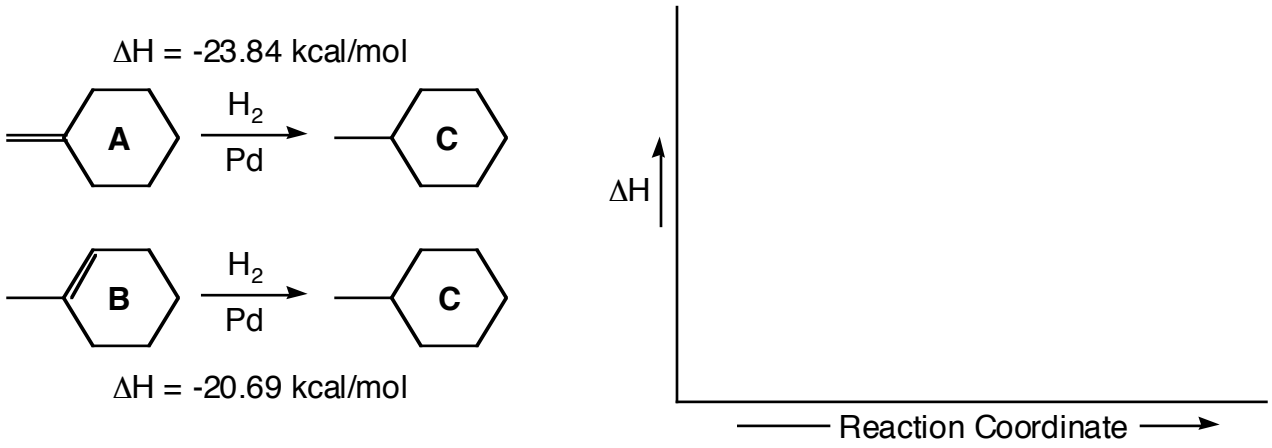
D)



6) The reaction of compound **A** with molecular chlorine in carbon tetrachloride yields **B** as the major product instead of the anticipated dichloride. Propose a mechanism that explains how **B** is formed. Be sure to show all intermediates and formal charges along the way. In your mechanism, there should be an opportunity to form a different cyclic product, **C**. Draw the structure of **C** and *briefly* explain why it is more favorable to form **B**. (14 points)

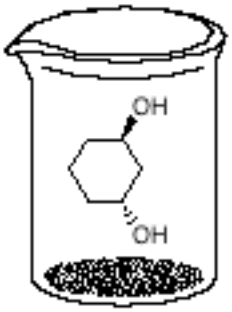


7) Based on the following hydrogenation data, which is more stable, the exocyclic alkene **A** or the endocyclic alkene **B**? Use a reaction energy diagram to illustrate your point. *Do not provide a theoretical reason, just base your answer on the experimental results.* (10 points)



8) Predict whether the contents of each beaker rotate plane polarized light and provide a brief reason for your decision. Where appropritate, describe how you would separate the pairs of compounds. If separation is not possible, indicate so and explain your answer. (16 points)

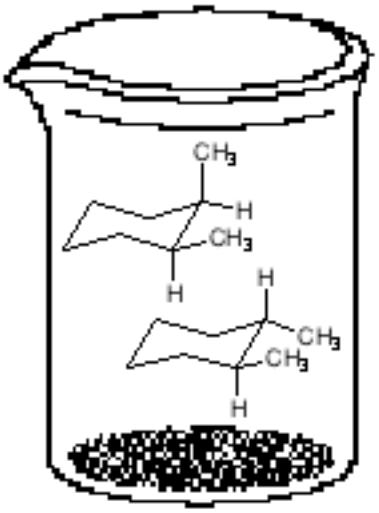
A)



Rotates plane polarized light? Yes or No

Why or why not?

B)



Rotates plane polarized light? Yes or No

Why or why not?

How would you separate these compounds? Describe the basis for the technique you propose or explain why they cannot be separated?

Grading Summary

Page	Point Value	Points Earned
2	28	
3	32	
4	24	
5	16	
extra credit	5	
	Total Score =	