

**Chemistry 116 Sec. A (7:50-8:50)**  
**Exam No. 2**

**“Conformational Analysis, Stereochemistry, Alkene  
Structure & Reactivity”**

**October 25, 2006**

**Instructions:** You will have 60 min. to complete the exam. At the 60 min. mark, I will request that all remaining test takers cease writing, turn their exams over, and pass them to their rightmost isle. If you finish within 55 min. you may turn in the exam at the front of the room prior to leaving. If you finish in 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  
(Please print)

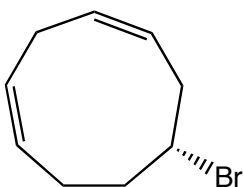
to abide by the instructions above. On my honor, I have neither given nor accepted any help during this exam.

**Signature:** \_\_\_\_\_

**College:** \_\_\_\_\_

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

- 1) Provide an unambiguous name for each of the following molecules. For each structure, indicate whether it is chiral, achiral, or meso by circling the correct description. (12 pts)



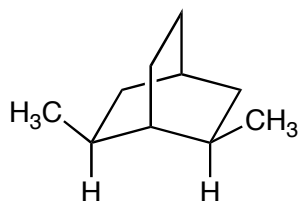
circle one

chiral

achiral

meso

\_\_\_\_\_



circle one

chiral

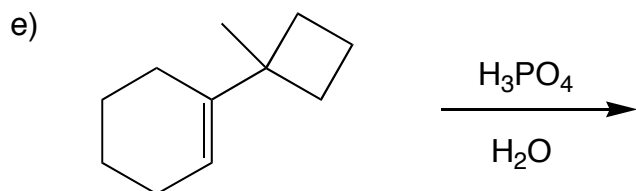
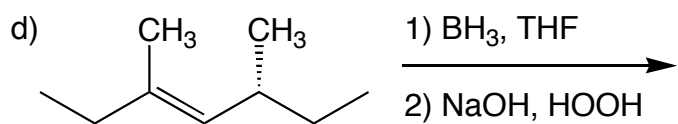
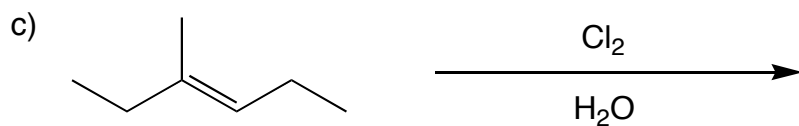
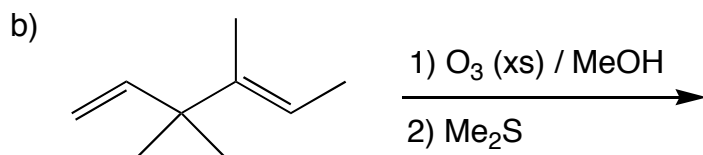
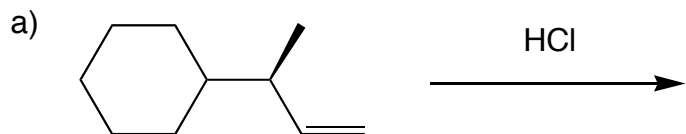
achiral

meso

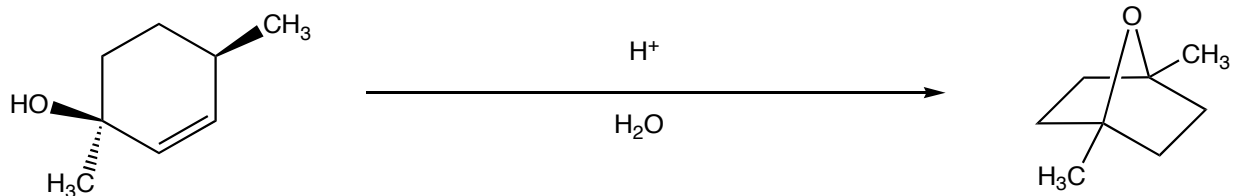
\_\_\_\_\_

- 2) Compound **A** ( $C_6H_{12}$ ) reacts with  $OsO_4/HOOH$  to give **B** & **C** as a mixture that does not rotate plane polarized light. **A** reacts with either  $H_2SO_4/H_2O$  or the sequence of 1)  $Hg(OAc)_2/H_2O$  2)  $NaBH_4$  to give the same product, **D**. Finally, when **A** is hydrogenated with  $H_2/Pd$ , only one compound, **E**, is formed. Provide structures & label them **A-E**. Be sure to jot down your thoughts and guesses for partial credit. (10 pts)

3) Predict the *major* organic product of each of the following reactions. If more than one product are equally favored, draw each product. (35 pts)

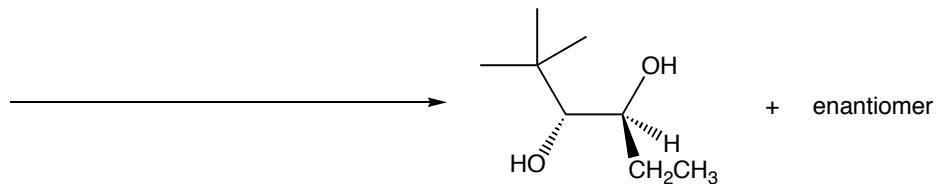


- 4) The compound below reacts with strong aqueous acid to give the bicyclic shown. From your knowledge of alkene addition reactions, provide a mechanism for this transformation. For full credit, you need to show all intermediates, formal charges, & electron pairs in your mechanism. (12 pts)

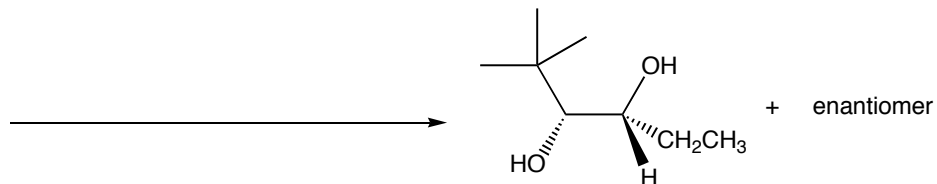


- 5) Propose reagents and starting materials that would achieve the following transformations. Then explain which reaction, **A** or **B**, would be more exothermic (circle the faster reaction)? Provide a concise but thorough explanation for your choice in the box provided. (12 pts)

**A**

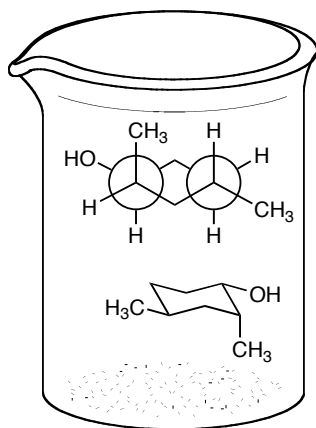


**B**



Explanation:

- 6) Decide whether the mixture of structures in each beaker would rotate plane polarized light & provide a concise & valid reason for your decision. Also, indicate whether the contents of each beaker can be separated by distillation (a process that differentiates compounds by boiling point). (12 pts)



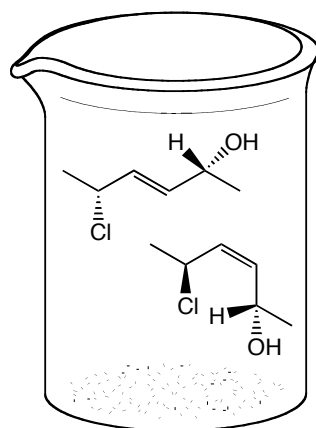
Rotates plane polarized light?

yes or no

Reason:

Separable by distillation?

yes or no



Rotates plane polarized light?

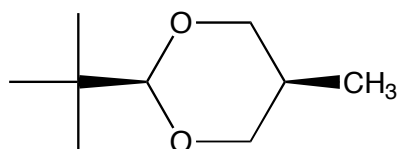
yes or no

Reason:

Separable by distillation?

yes or no

- 7) Use conformational analysis to determine (i.e. explain using pictures and words) which compound is more stable. Circle the more stable compound. (7 points)



versus

