Exam 2 Chem 3045x Wednesday, November 5, 1997

Instructions: This is a closed book examination. You may not use any notes, books or external materials during the course of the examination. Please **print** your name and social security number on the front page of the examination. Be sure to allot your time in a manner that is related to the point value of the question. Be sure to show your reasoning wherever possible for partial credit.

All material to be graded must be on one of the pages of the exam with your name and social security number on the front page. If you need more space than is available on the page with the questions, use the back page of the previous page and label the number of the question on that page.

Your Name: _____

Your Soc. Sec. Number: _____

Time of the exam: 50 minutes.

Question 1:	10 points	_____
Question 2:	10 points	_____
Question 3:	10 points	_____
Question 4:	10 points	_____
Question 5:	10 points	_____
Question 6:	10 Points	_____
Question 7:	10 Points	_____
Question 8:	10 Points	_____
Question 9:	20 Points	_____
Total:	100 Points	

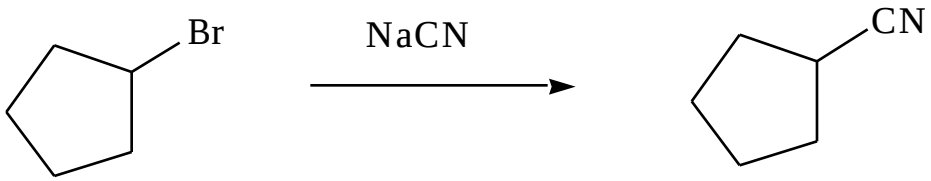
1. (10 Points) Draw the molecular structure corresponding to the most stable conformers of each of the following molecules. Which of these structures is chiral? Explain your reasoning.

cis-1,2-dichlorocyclohexane

cis-1,3-dichlorocyclohexane

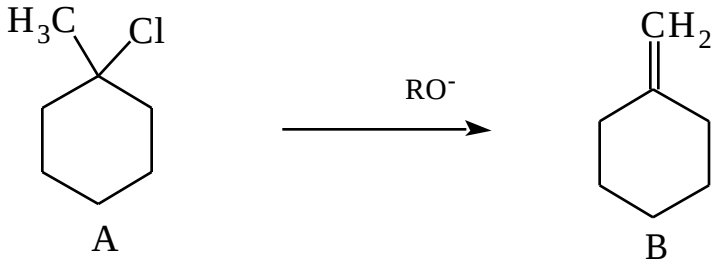
cis-1,4-dichlorocyclohexane

2. (10 Points) The reaction of cyclopentyl bromide with NaCN in acetone solvent yields cyclopentyl cyanide. The same reaction occurs when a small amount of NaI is added to an acetone solution containing cyclopentyl bromide and NaCN. However, the reaction occurs at a faster rate, i.e., the reaction is catalyzed by the addition of NaI. Suggest a reasonable explanation of the catalytic function of sodium iodide in the conversion of the bromide to the cyanide.

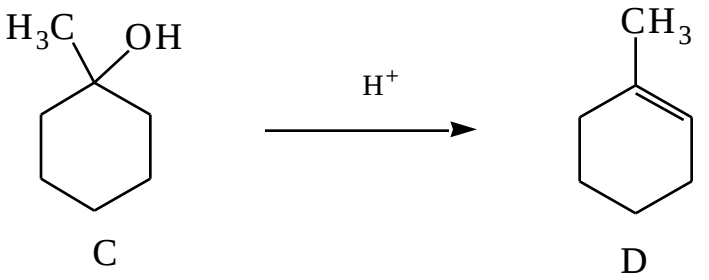


3. (10 Points) How many signals do you expect to see in the proton NMR of 2-pentanol? How many signals do you expect to see in the carbon 13 NMR of 2-pentanol? Explain your reasoning.

4. (10 Points) The chloride A yields the elimination product B upon treatment with base (RO^-), while the alcohol C yields the elimination product D upon treatment with acid. Explain why the eliminations yield different products.

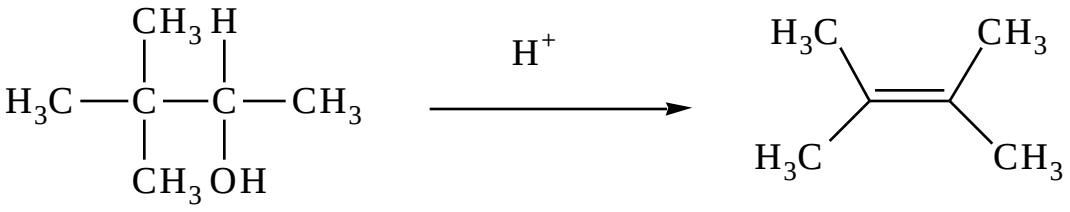


A B



C D

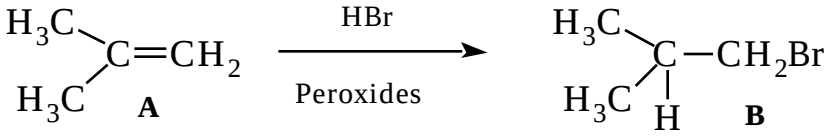
5. (10 Points) Treatment of the alcohol A leads to an ethylene with a rearranged carbon skeleton, B. Explain in terms of a mechanism.



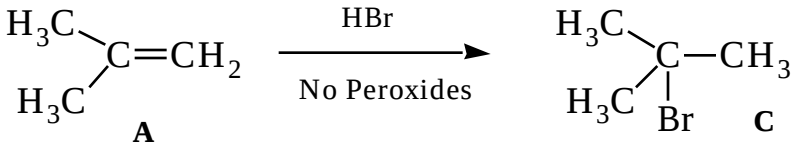
A B

6. (10 Points) The ethylene A yields product B when treated with HBr and peroxides, but yields product C when treated with peroxide free HBr. Give a mechanistic interpretation of these results.

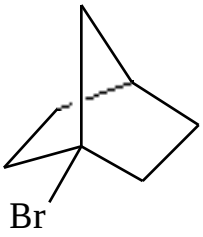
(a)



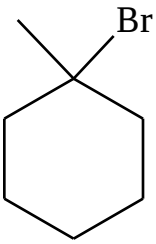
(b)



7. (10 Points) Consider the two tertiary bromides, A and B. One of these bromides is very reactive to elimination under basic conditions and is also reactive to nucleophilic substitution under acidic conditions, while the other is completely inert to both elimination and substitution under the same conditions. Which bromide is inert and why?

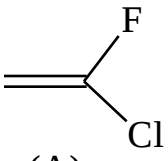


(A)

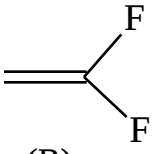


(B)

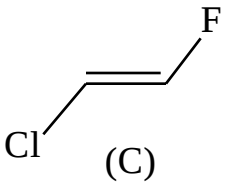
8. (10 Points) Imagine molecules that existed in "Flatland", that is two dimensional space. Translating the ideas of chirality in three dimensional space to two dimensional space, which, if any, of the following molecules are chiral in "Flatland"? Explain your reasoning.



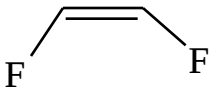
(A)



(B)

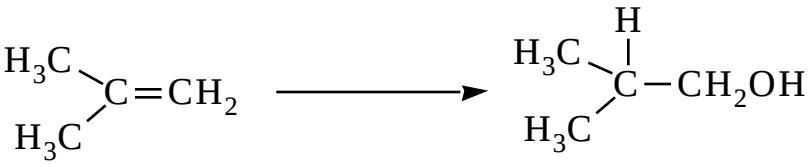


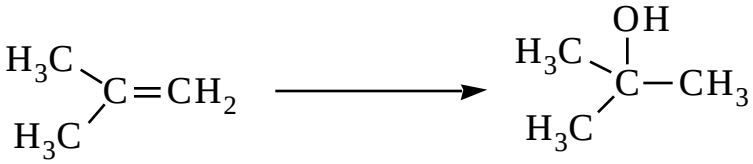
(C)

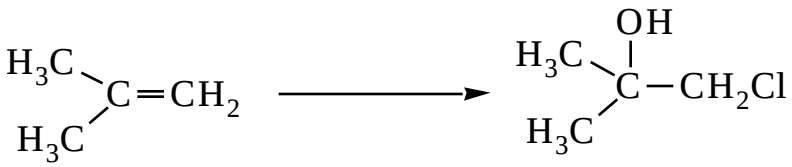


(D)

9. (20 Points) Indicate how you would achieve the following syntheses. Do not write mechanisms, just indicate the steps and reagents required to achieve the reactions indicated.

(a) 

(b) 

(c) 

(d)