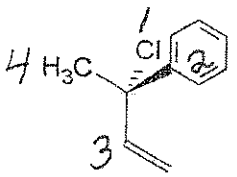
Spring 2012 Midter-I

1. Determine the R or S configuration of each of the chiral centers in the molecule shown below. Clearly number the priority of each group. (8 points, 6 minutes)

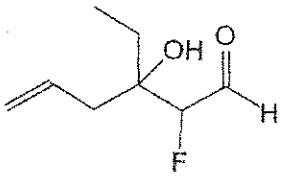
Ch.3



S

2. Give the IUPAC name of the following molecule. (8 points, 6 minutes)

Ch.2

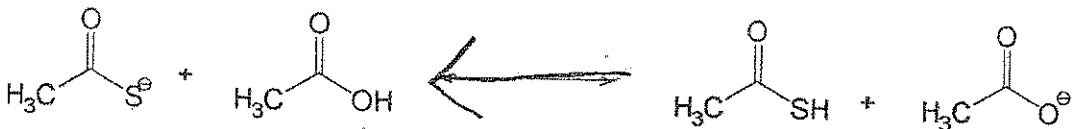


3-ethyl-2-fluoro-3-hydroxy hex-5-enal

3. Label all the acids and bases in the following reaction. (8 points, 6 minutes)

Does the reaction go to the right or to the left?

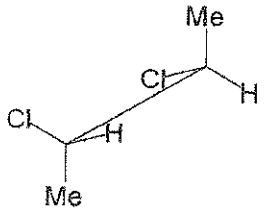
Ch.4



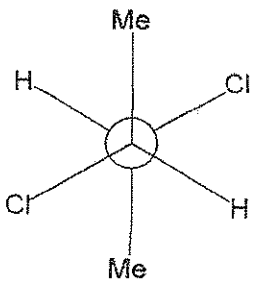
Base Acid Acid Base

4. What is the relationship between these two molecules (identical, enantiomers, diasteriomers, unrelated)? *You are not required to determine R and S.* (8 points, 6 minutes)

Ch.213

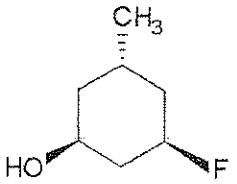


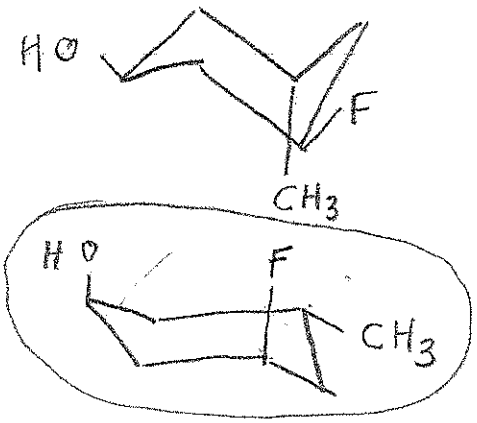
chiral



meso 3

5a. Draw both chair conformations of the following molecule. (15 points, 12 minutes)





7.28

Ch. 2

1.0 + 3.9 = 4.9

5b. Using the data below, calculate the energy difference between the two chair conformers. Show your work.

Benefit of Equatorial over Axial in kJ/mol

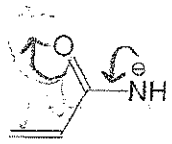
Group	$-\Delta G^\circ$ (kJ/mol)	Group	$-\Delta G^\circ$ (kJ/mol)
C≡N	0.8	NH_2	5.9
F	1.0	COOH	5.9
C≡CH	1.7	$CH{=}CH_2$	7.1
I	1.9	CH_3	7.28
Cl	2.2	CH_2CH_3	7.3
Br	2.4	$CH(CH_3)_2$	9.0
OH	3.9	$C(CH_3)_3$	21.0

7.3 − 4.9 = 2.4

5c. Circle the lower energy chair conformer.

6. Draw one reasonable resonance structure for the following molecule. The resonance structure you draw should be a major contributor, a stable resonance structure.
(6 points, 4 minutes)

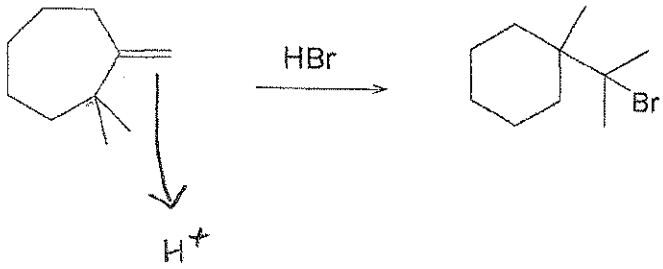
Ch. 1

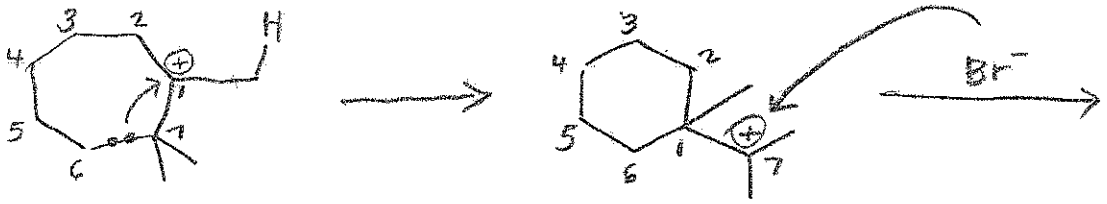


arrows are not required

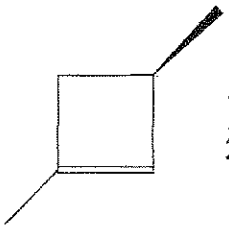
7. Give a step by step mechanism for each of the following reaction. (12 points, 9 minutes)

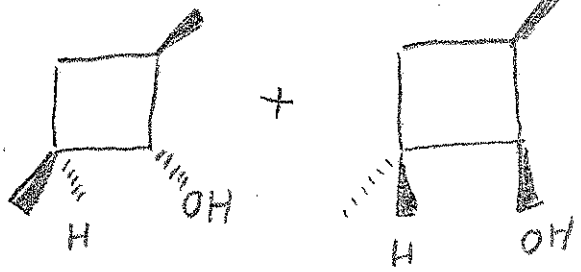
Ch. 6

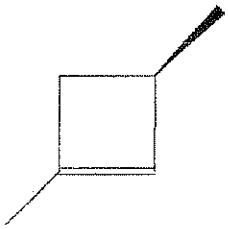


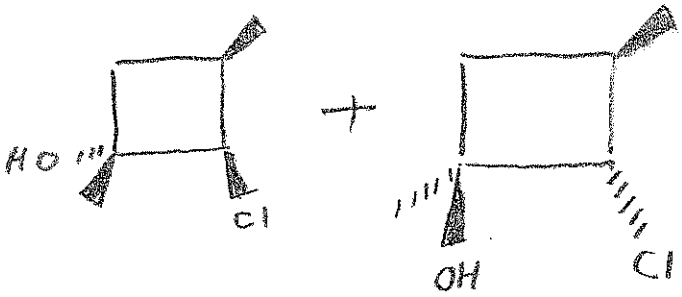


8. Give the product or products of each of the following reactions.
Be sure to include stereochemistry and to show all products that form. (7 pts each, 5 min each)

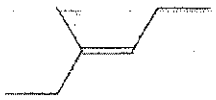
a. 

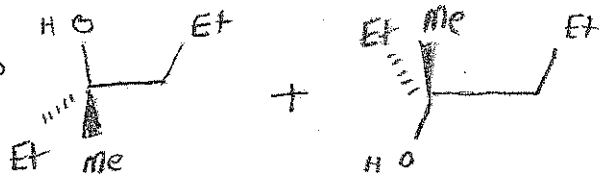


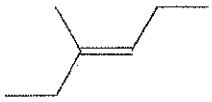
b. 

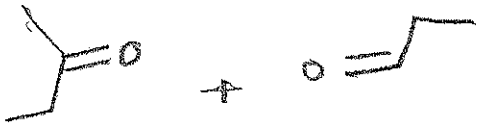


Ch.3/6

c. 



d. 



e.