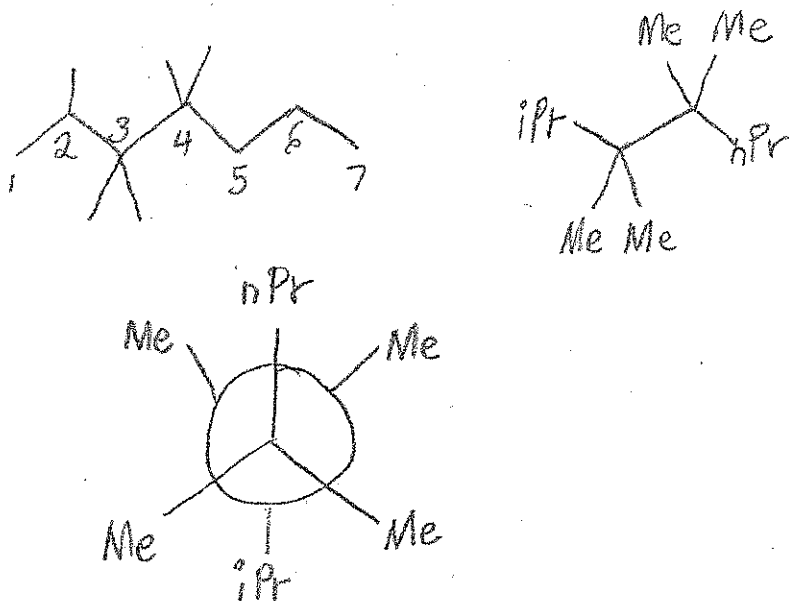


1. Draw a Newman projection along the C3-C4 bond of the most stable conformation of 2,3,3,4,4-pentamethylheptane. (8 points)

Ch. 2/3



2. What is the IUPAC name of the following compound?

(6 points)

Ch. 2

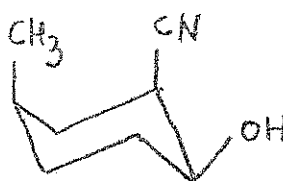
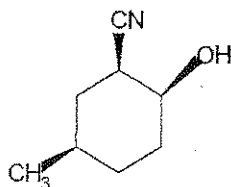


bicyclo [ 3, 2, 0 ] heptane

3a. Draw both chair conformations of the following molecule.

(16 points)

Ch. 2



3b. Use the data below to calculate the energy difference between the two chair conformers.

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 <sub>2</sub>	5.9
F	1.0	COOH	5.9
C≡CH	1.7	CH=CH <sub>2</sub>	7.1
I	1.9	CH <sub>3</sub>	7.28
Cl	2.2	CH <sub>2</sub> CH <sub>3</sub>	7.3
Br	2.4	CH(CH <sub>3</sub> ) <sub>2</sub>	9.0
OH	3.9	C(CH <sub>3</sub> ) <sub>3</sub>	21.0

CN-OH gauche interaction is identical in both molecules.

axial OH 3.9

axial CH<sub>3</sub> 7.28

axial CN 0.8

8.08

$$\begin{array}{r} 8.08 \\ - 3.9 \\ \hline 4.18 \end{array} \leftarrow \text{energy difference}$$

4a. Label all acids and bases in the following reaction. (10 points)

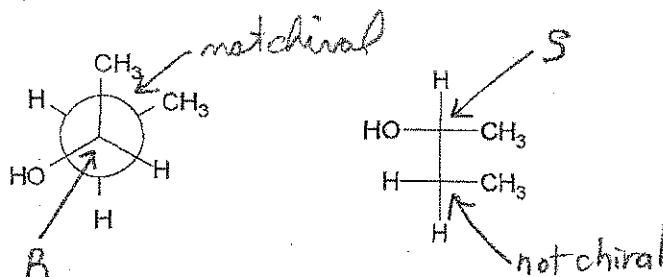
4b. Which way does the reaction go – to the right or to the left? Justify your answer.



reaction goes to left

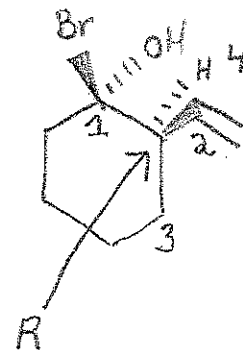
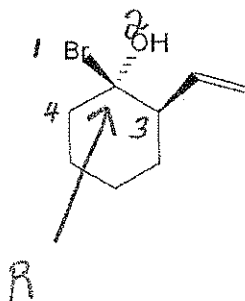
$(\text{CH}_3)_3\text{N:}$  is a stronger base because N has a smaller atomic radius than P.

5. What is the relationship between the following two molecules - identical, enantiomers, diastereomers, conformers, constitutional isomers, or unrelated? (6 points)

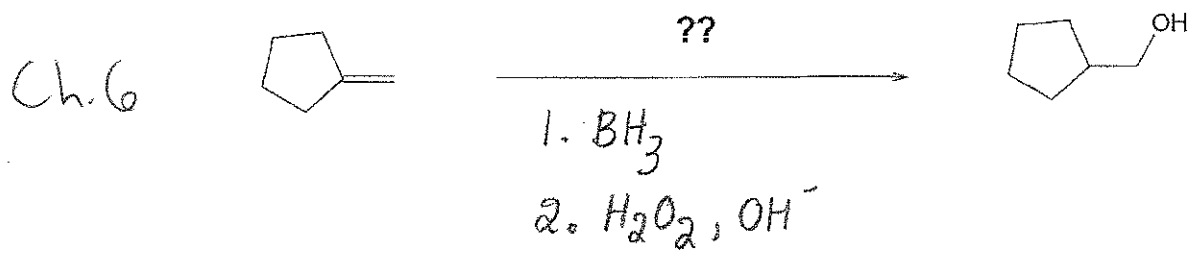


6a. Give the R or S configuration of all chiral centers in the following molecule. Clearly number the priority of each group (1, 2, 3, 4). (14 points)

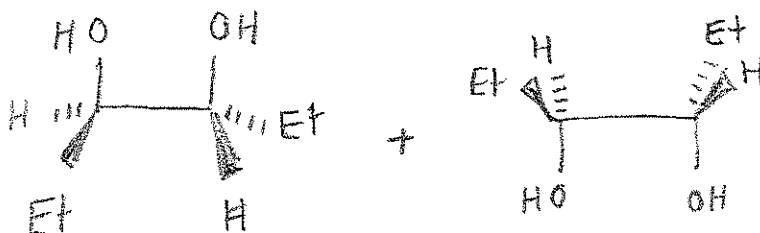
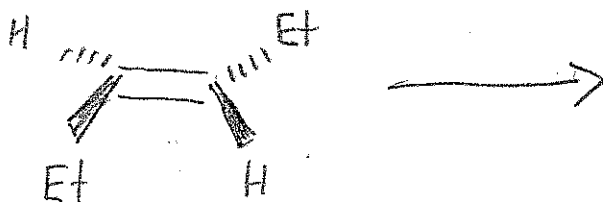
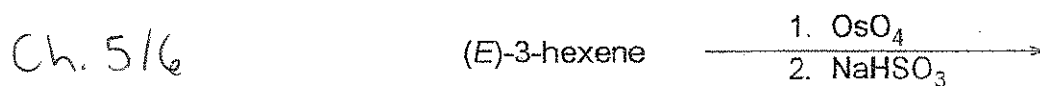
6b. Is the overall molecule chiral? YES



7. What reagent or reagents are needed to accomplish the following reaction? (5 points)



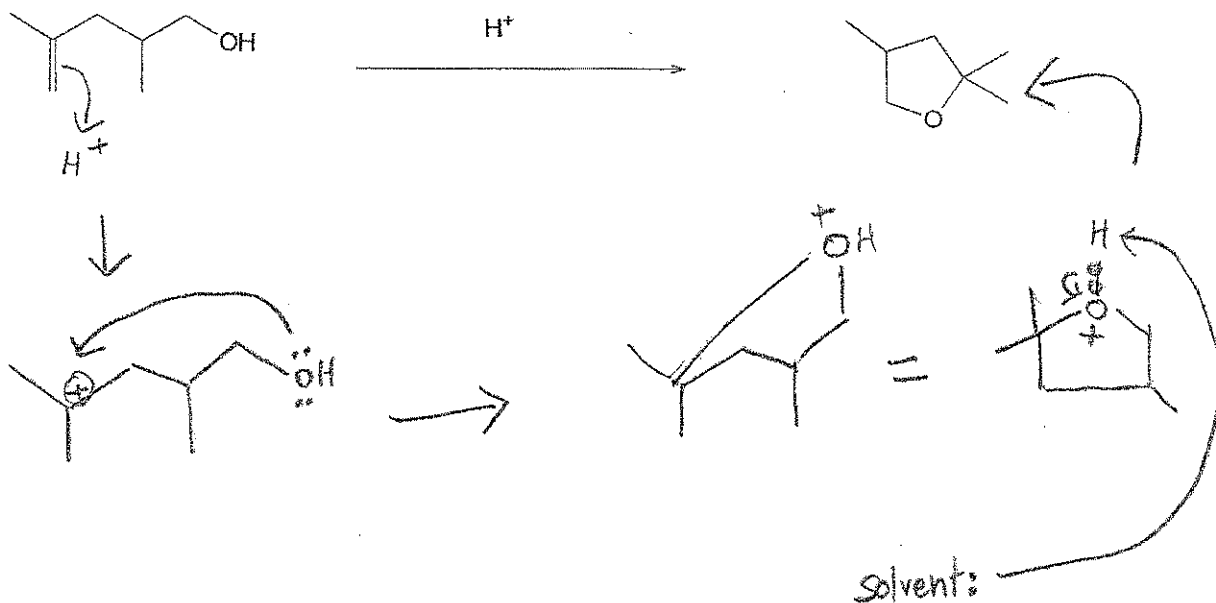
8. Draw the product or products that form in the following reaction. (10 points)



9. Show the mechanism for the following reaction.

(10 points)

Ch. 6



10. Draw ALL of the products that form in the following reaction. Be sure to show the STEREOCHEMISTRY of each product.

(15 points)

Ch. 3/6

