

Exam #2

Chemistry 333

Principles of Organic Chemistry I

Tuesday April 19, 2005

Name: _____.

The exam is worth a total of 100 points; there are six questions. Please show all work to receive full credit for an answer.

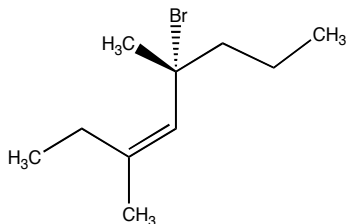
By putting your name on this exam, you agree to abide by California State University, Northridge policies of academic honesty and integrity

Molecular models are allowed for this exam. Calculators are not needed.

Good Luck!

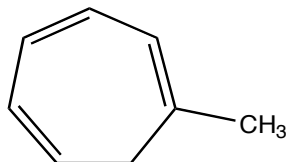
1. a. Use the IUPAC rules to write the systematic name for the following alkenes (10 pts). Use *S,R* and *E,Z* designations where appropriate:

a.



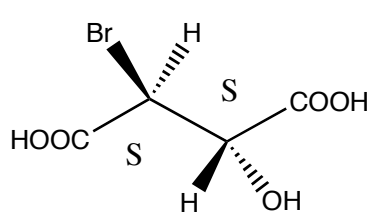
(*R,Z*)-5-bromo-3,5-dimethyloct-3-ene

b.

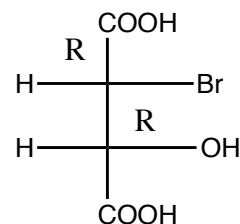
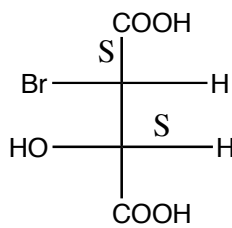


(1*Z*,3*Z*,5*Z*)-1-methylcyclohepta-1,3,5-triene

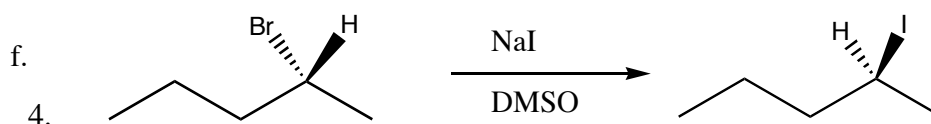
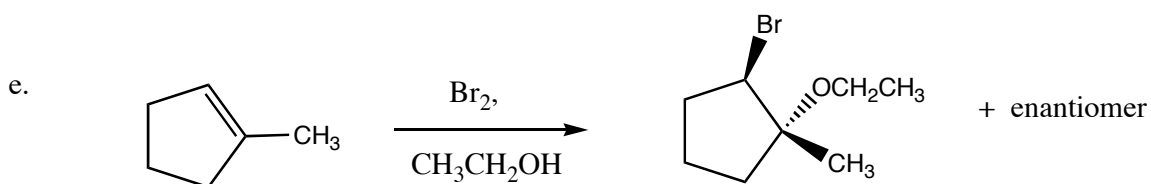
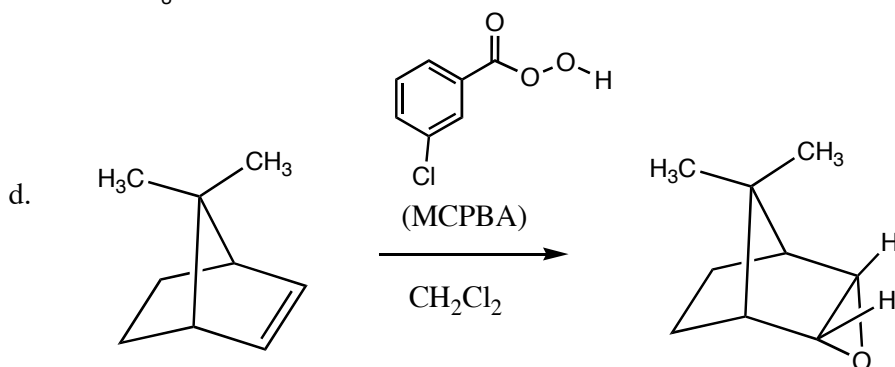
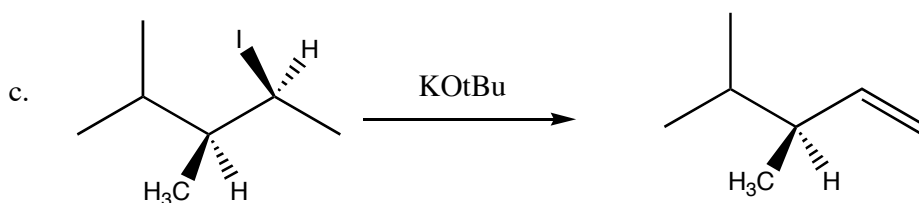
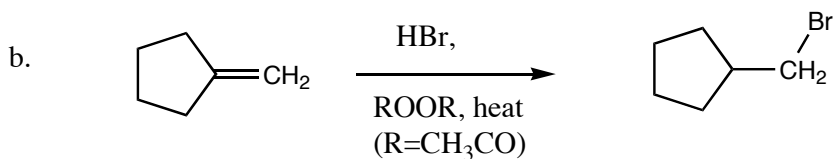
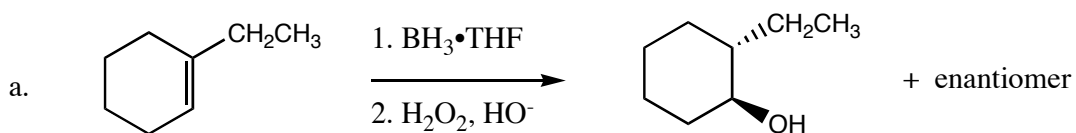
2. Draw a Fischer projection for the molecule shown below. Label the configuration (*R* or *S*) of the asymmetric carbon atoms in each structure. (10 pts).



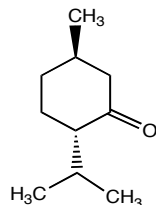
(2*S*,3*S*)-2-bromo-3-hydroxysuccinic acid



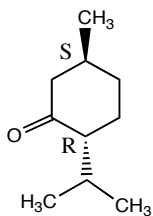
3. Predict the product(s) of the following reactions, noting cis/trans stereochemistry where appropriate and indicating when a racemic mixture of enantiomers is formed: (5 pts. each)



4. For the following optically active substance ($[\alpha]_D = -10^\circ$) (4 pts each):

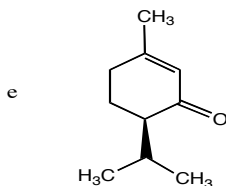
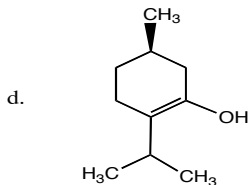
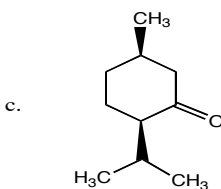
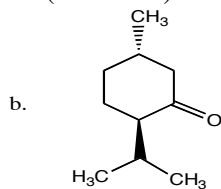


- a. Draw the structure of the enantiomer of the compound shown above, labeling the configuration of the asymmetric carbons. Indicate the sign and magnitude of $[\alpha]_D$



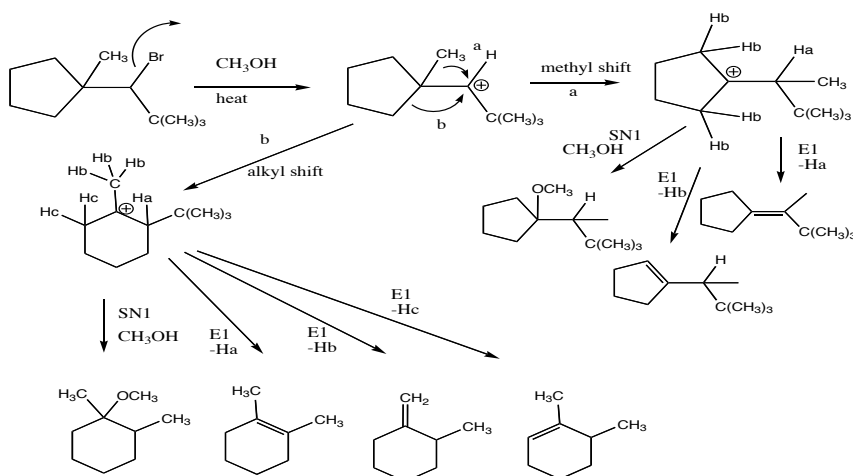
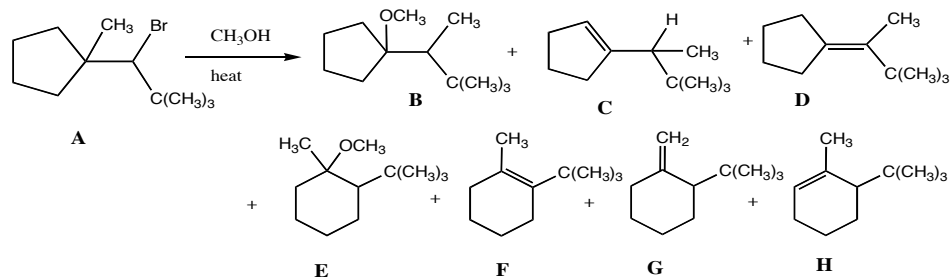
$[\alpha]_D = +10^\circ$

What is the stereochemical relationship of the molecules shown below to the one drawn in a? Possibilities include: enantiomers, diastereomers, identical compounds, constitutional (structural) isomers, and different compounds that are not isomeric.

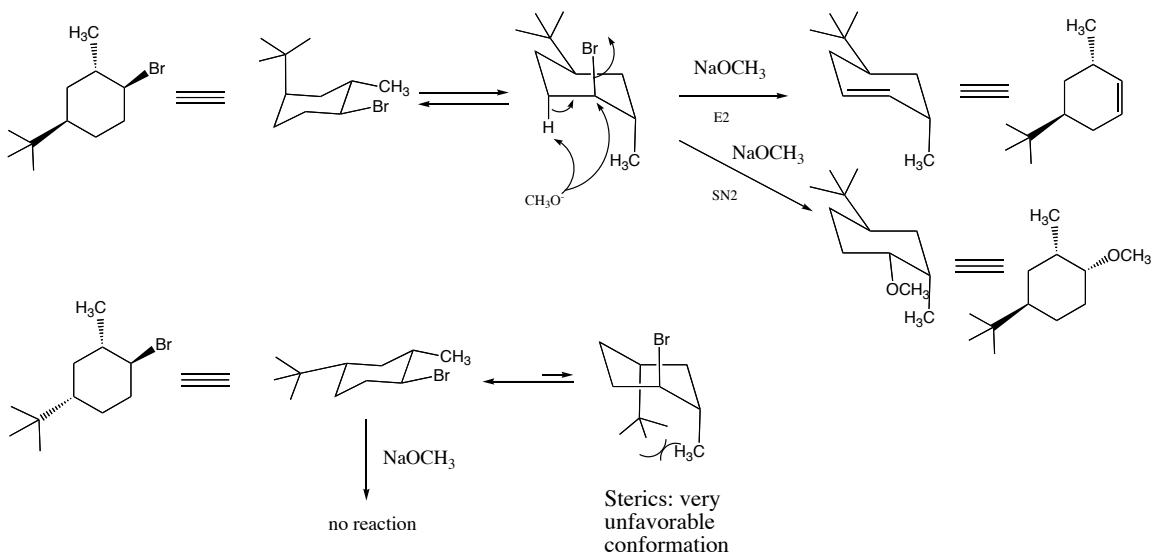
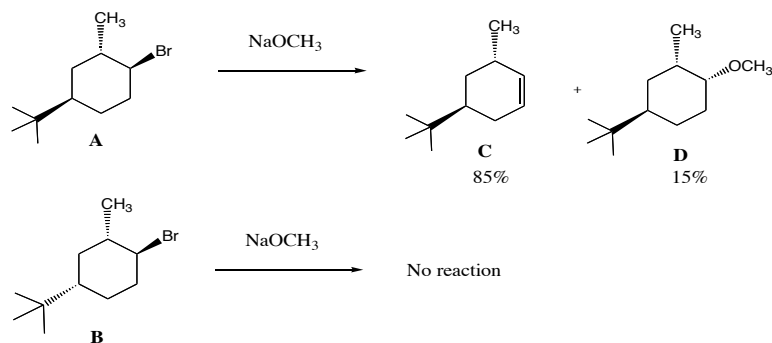


b. same c. diastereomer, d. structural isomer e. different compound (non-isomeric)

5. When bromide **A** is heated in methanol, seven compounds (**B-H**) are produced. Draw a detailed, step-by-step mechanism for the reaction using the curved arrow notation, and accounting for the formation of all observed products. Why are alkenes **D** and **F** produced in greater amounts than alkenes **C**, **G**, and **H**? (20 pts.)

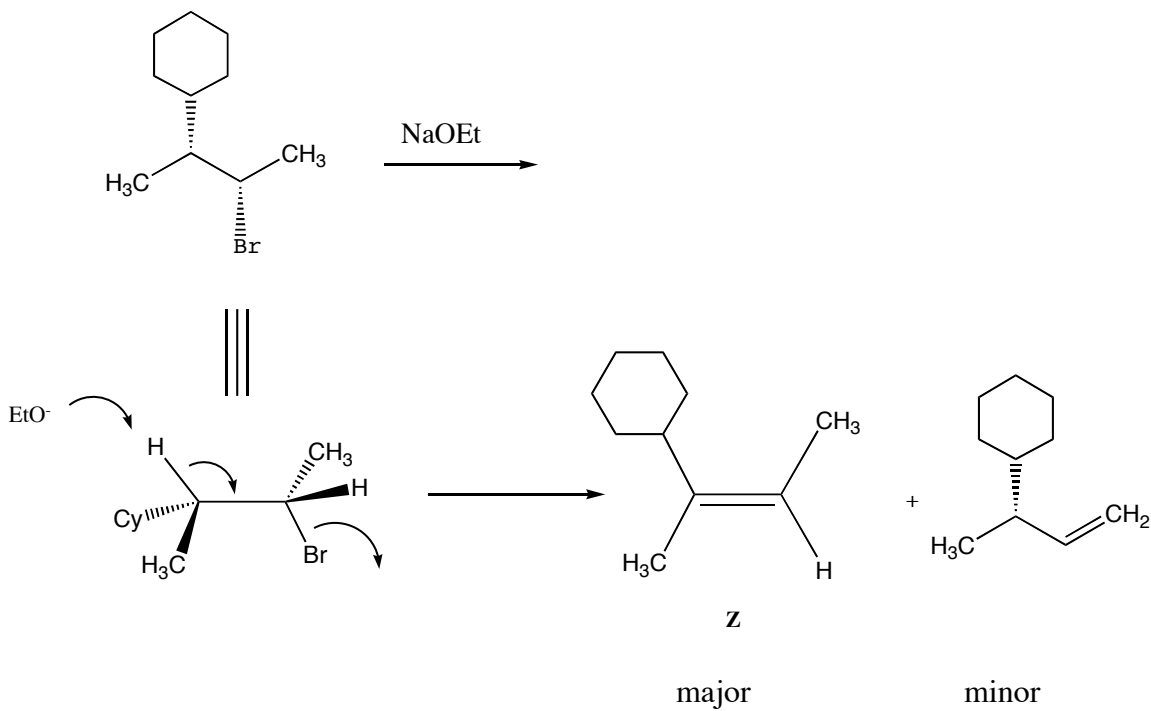


6. a. Upon treatment with sodium methoxide, compound A below produces compounds C and D; similar treatment of B with sodium methoxide shows no reaction. Rationalize why C and D are formed from A but not B (10 points)



Bonus:

Predict the structure of the major alkene product resulting from subjection of the alkyl bromide shown below to sodium ethoxide. Specify the configuration (E,Z) of the alkene(s) produced if appropriate (10 points)



Congratulations!

Score:

1. _____ /10

2. _____ /10

3. _____ /30

4. _____ /20

5. _____ /20

6. _____ /10

Bonus: _____ /10

Total: _____ /100

