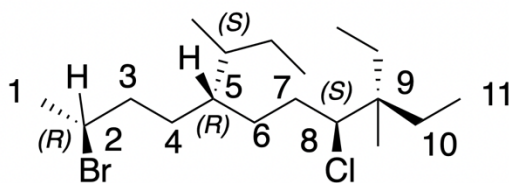
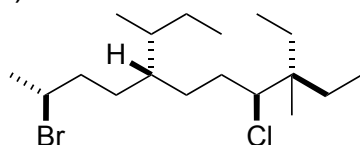


Name: \_\_\_\_\_  
UIN: \_\_\_\_\_

Chemistry 236 Organic Chemistry I – Fall 2023  
Midterm #2

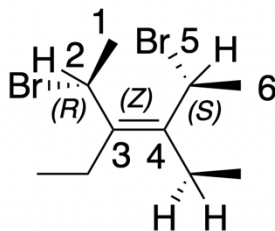
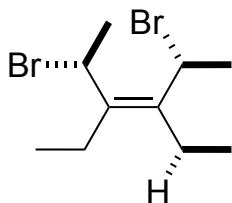
1. What is the IUPAC name for the following compounds? (12 points total/4 each)

a)



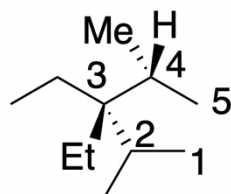
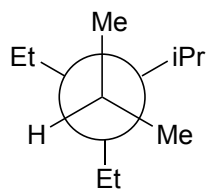
(2*R*,5*R*,8*S*)-2-bromo-5-((*S*)-*sec*-butyl)-8-chloro-9-ethyl-9-methylundecane

b)



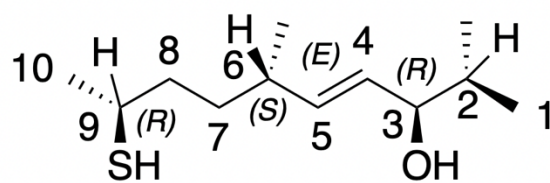
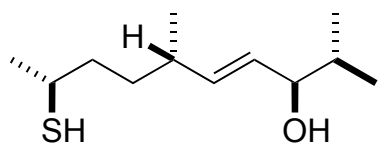
(2*R*,5*S*,*Z*)-2,5-dibromo-3,4-diethylhex-3-ene

c)



3,3-diethyl-2,4-dimethylpentane

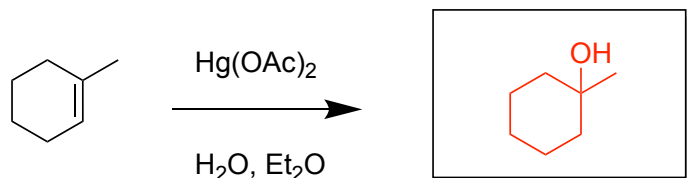
d)



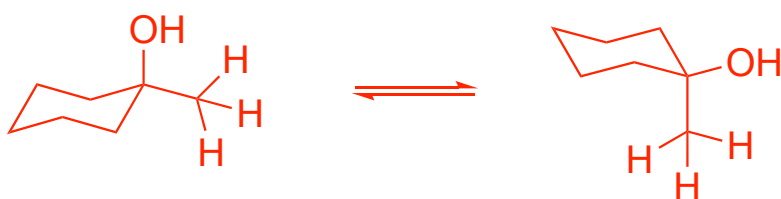
(3R,6S,9R,E)-9-mercapto-2,6-dimethyldec-4-en-3-ol

2.

a) Indicate the major product for the following reaction.



b) Draw the above product in chair conformation and then perform a ring flip to obtain the other chair conformation.



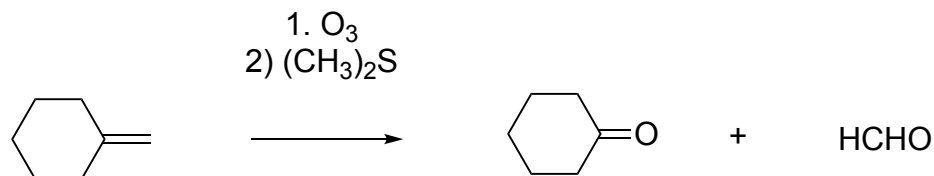
c) Indicate which of the two chairs are the least favorable and provide an explanation to support your answer.

The ring on the left is more stable. The A-value for a methyl group is 1.74 and that for a hydroxyl group is  $\sim 0.6$ . You are not expected to know these values; however, if you compare the two substituents, you will see that the 3 hydrogen atoms occupy more 'space' and therefore it is preferred to be in the equatorial position.

d) For any stereocenters that may be present, provide an R / S assignment.

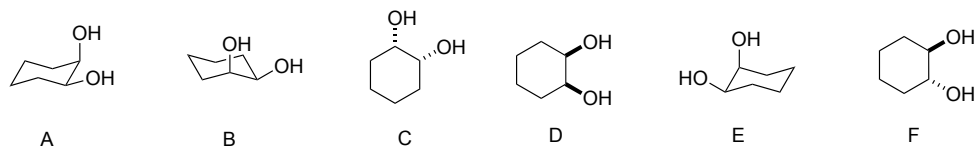
N/A

3. Draw the entire arrow pushing mechanism for the following reaction. Include all intermediates for full credit.



Please see notes for full mechanism.

3. Determine the relationship between the following compounds.



a) Compound A and D

**Homomers**

b) Compound C and E

**Homomers**

c) Compound A and C

**Homomers**

d) Compound F and A

**Diastereomers**

4. Answer the following questions using a maximum of two sentences.

a) Explain why the reaction between 2-butene and HBr results in a racemic mixture of products.

The reaction proceeds via a carbocation intermediate which is planar nature. Because of this planarity, the bromine can attack from either side, leading to a racemic mixture of products.

b) Explain how (2R,3R)-(+)-tartaric acid can be used to separate the following pair of enantiomers.



(2R,3R)-(+)-tartaric acid can be used to separate these enantiomers by forming diastereomeric complexes which have different physical properties, allowing them to be separated using techniques like silica gel chromatography or crystallization.

c) Provide a definition of a Meso compound.

A meso compound is a molecule that has at least one chiral center but overall is still achiral due to its internal plane of symmetry. This results in mirror-image halves that cancel out its optical activity.

d) Explain why it is why unfavorable to ring-flip trans-decalin.

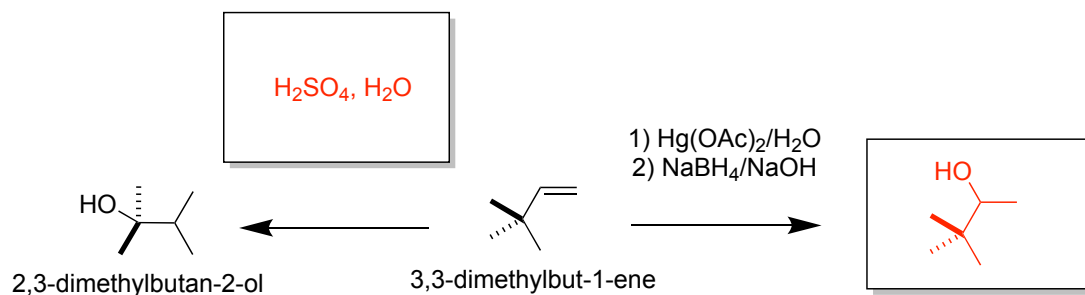
Ring-flipping trans-decalin is unfavorable because it would result in the two larger substituents being in a 1,3-diaxial orientation, leading to steric hindrance / clash.

e) Explain what a 1,3-diaxial interaction is.

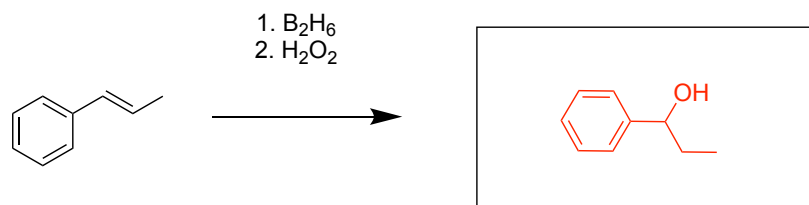
For a cyclohexane ring, substituents that occupy the axial position experience steric hindrance due to 1,3-diaxial interactions. Overall, this increases strain and make certain conformations less stable.

6) Indicate the reactants or the major product for the following reactions. (20 points in total, first four blanks are 4 points each, other two are 2 points each)

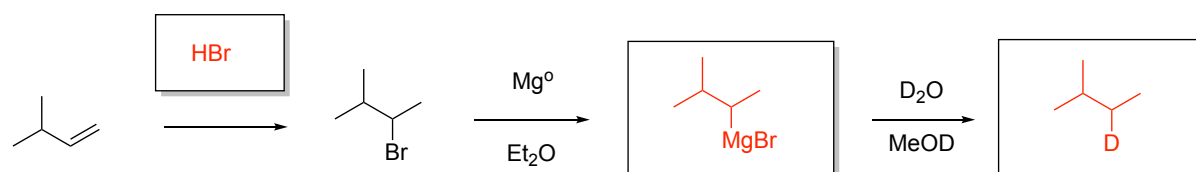
a)



b)

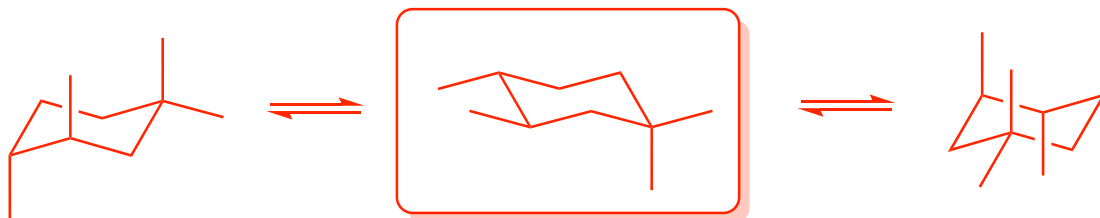
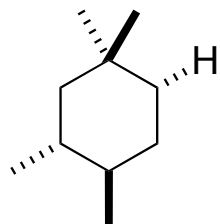


c)



6) Convert each of the following compounds into chair form, perform **TWO** consecutive ring flip, and indicate a most stable chair.

a)



b)

