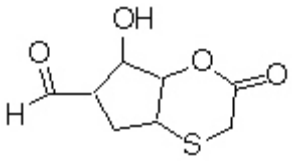
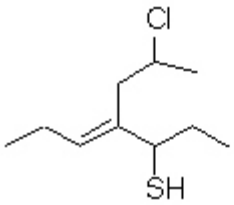
Dr. Davies
Chem. 2310
Review for Final

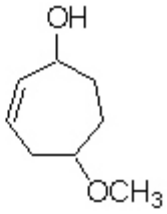
I. **Nomenclature**:

1. Circle and identify the functional groups present in the following molecule.



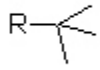
2. Circle the correct name or provide an IUPAC name for each molecule.



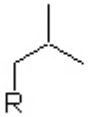


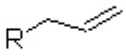
3. Provide common names for the following substituents.

Example:

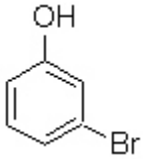


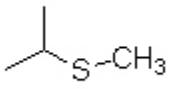
tert-butyl





4. Provide common names for the following compounds.





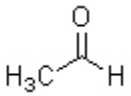
II. **Theory**:

1. How many degrees of unsaturation in the molecular formula C_7H_9N?

a) 1 b) 2 c) 3 d) 4 e) 5

2. Indicate the molecular orbital resulting from each combination of atomic orbitals.

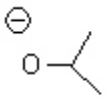
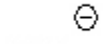
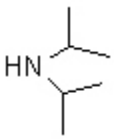
3. Which of the following compounds has the greatest dipole moment?

a) $CHCl_3$ b)  c)  d) CO_2

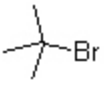
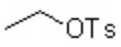
4. For the following molecule do the following:

a) Fill in any formal charges.
b) Draw all significant resonance structures and indicate the major contributor
c) Indicate the hybridization on N.

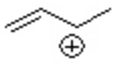
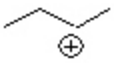
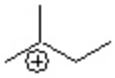
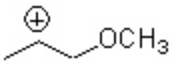
5. Indicate which of the following is the best nucleophile.

a) NH_3 b)  c)  d) 

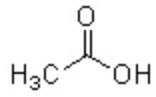
6. The electrophile that is most reactive in an S_N2 reaction is...

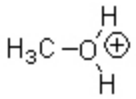
a) H_3C-OH b)  c)  d) $OH^{\ominus}$

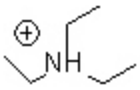
7. Which cation would be expected to give rearrangement products?

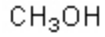
a) 
b) 
c) 
d) 

8. Which compound is most acidic?

a) 

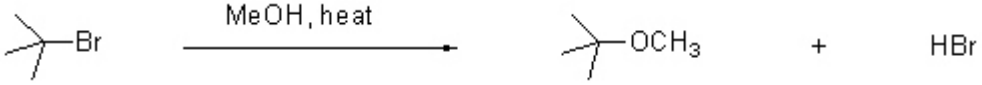
b) 

c) 

d) 

9. Predict the products and their relative abundance resulting from the chlorination of propane.

10. Draw an energy diagram for the following reaction.

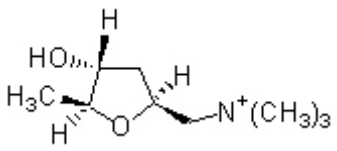


III. **Conformations and Stereochemistry**

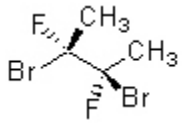
1. Draw the staggered Newman projections for (2R) 2-bromo-4-methylpentane through the C2/C3 bonds**.** Then rank them in order of stability with 1 being least stable and 3 being most stable.

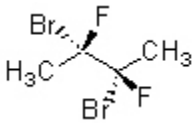
2. Draw the most stable chair conformations for *cis*-1-bromo-3-tert-butylcyclohexane and *trans*-1-bromo-3-tert-butylcyclohexane. Label each substituent as axial or equatorial, and then indicate which compound undergoes E2 elimination the fastest.

3. Muscarine, shown below, is a poisonous chemical found in mushrooms. Indicate each chiral center with an asterisk, then assign R or S.

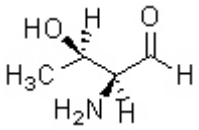


4. State the relationship between the following compounds as identical, enantiomeric, or diastereomeric**.** Indicate any meso compounds.



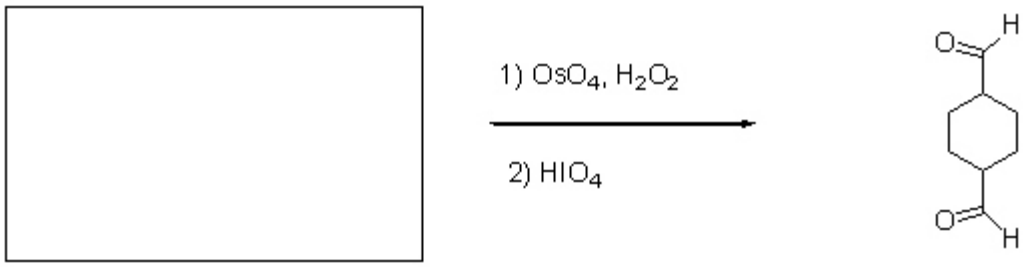


5. Translate the Newman projection to a Fisher projection.

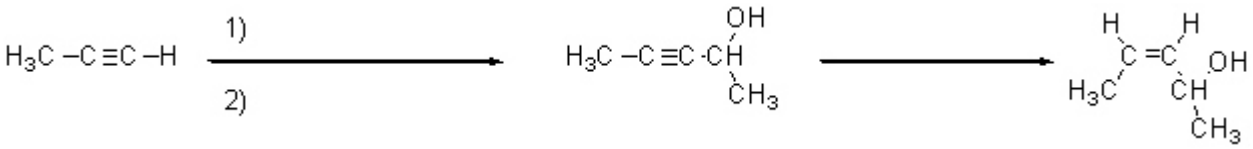


IV. Reactions:

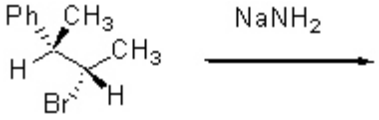
1. State the correct starting material for the following reaction.



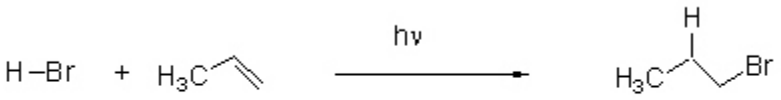
2. Indicate the necessary reagents for the following conversion.



3. Provide 1 substitution product and 2 elimination products. Indicate the major elimination product.



4. Given the following bond dissociation energy (Kcal/mol) and reaction do the following:



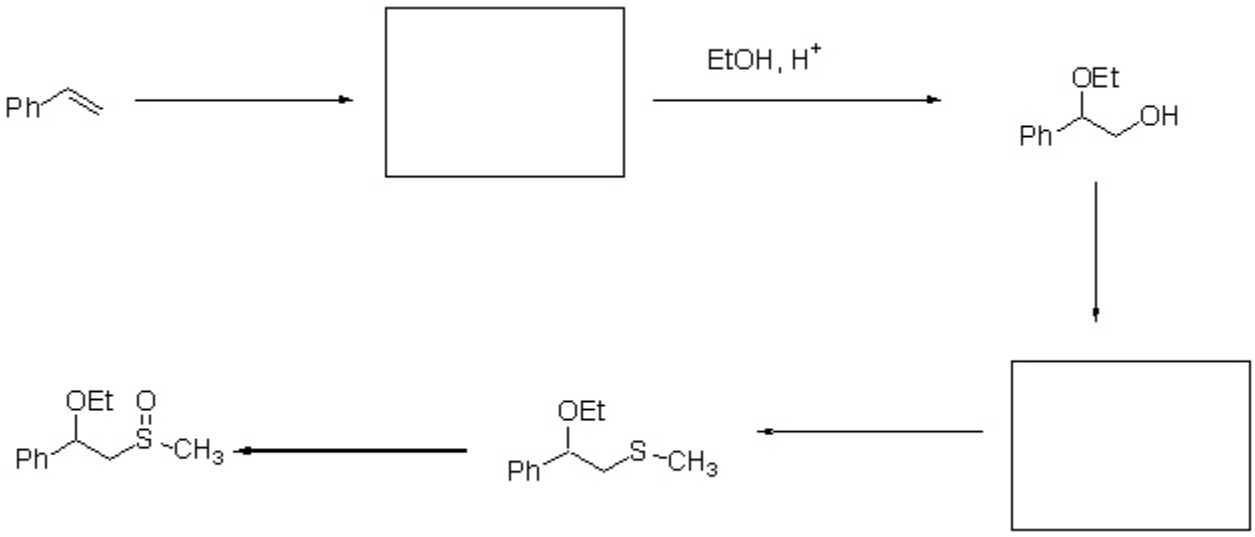
BDE (Kcal/mol)	
H-Br	88
C=C	62
2°C-H	95
1°C-Br	68

1. Provide a step-by-step mechanism and indicate whether each step is endothermic or exothermic and by how much.

2. Is the overall reaction endothermic or exothermic? By how much?

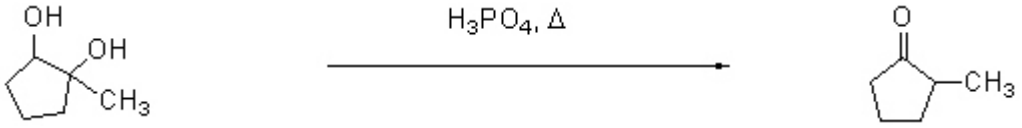
V. **Synthesis**:

1. Fill in the appropriate starting materials, products and reagents for the following synthesis. (Hint: It may help to work backwards).



VI. **Mechanism**:

1. Provide an arrow pushing mechanism for the dehydration of the alcohol below. Include all intermediates, formal charges, and correct arrow pushing:



VII. **Extra Credit**:

1. Complete the following synthesis: