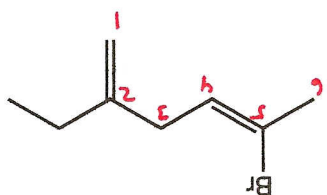
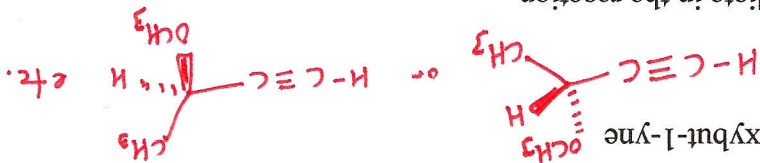


I. Answer each of the following.

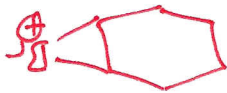
1. Give the IUPAC name. Include the geometry using E/Z designations.



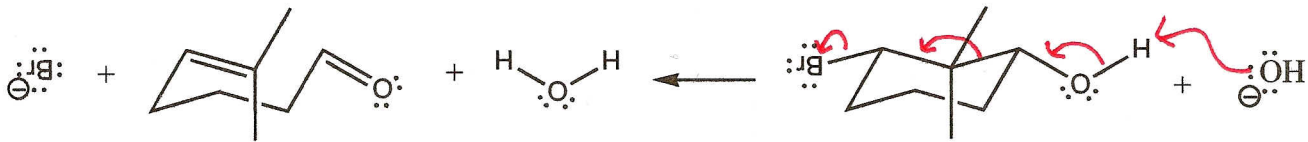
2. Draw the structure of R-3-methoxybut-1-yne



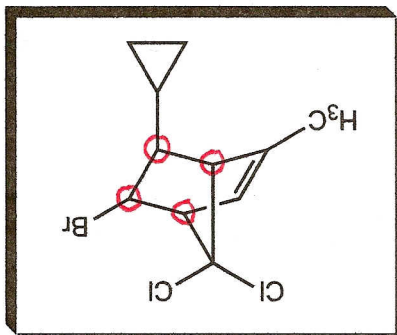
3. Draw the likely organic intermediate in the reaction mechanism when cyclohexene reacts with bromine.



4. The reaction shown below is called a Grob fragmentation and will not be familiar to you. Examine the product that is formed to see which bonds were formed and broken and draw the appropriate curved arrows on the reactants that would lead to the formation of the products shown.



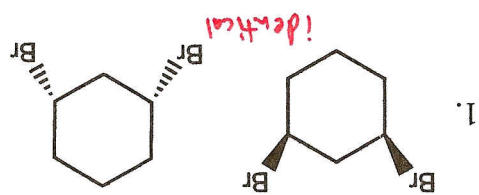
5. Circle every chiral center in the compound shown.



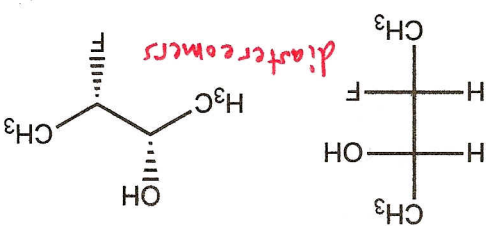
6. The antineoplastic agent mepitostane is used to treat breast cancer. The specific rotation is +22.5 deg. What is the specific rotation of a 90:10 mixture of (+)-mepitostane:(-)-mepitostane? $80\% \ll$

$$(+22.5^\circ) \cdot (0.50) + (-22.5^\circ) \cdot (0.10) = 18^\circ$$

II. Examine each pair of compounds and write the relationship between them. Choose among: identical, enantiomers, diastereomers, constitutional isomers, geometric isomers, or not isomers



2.

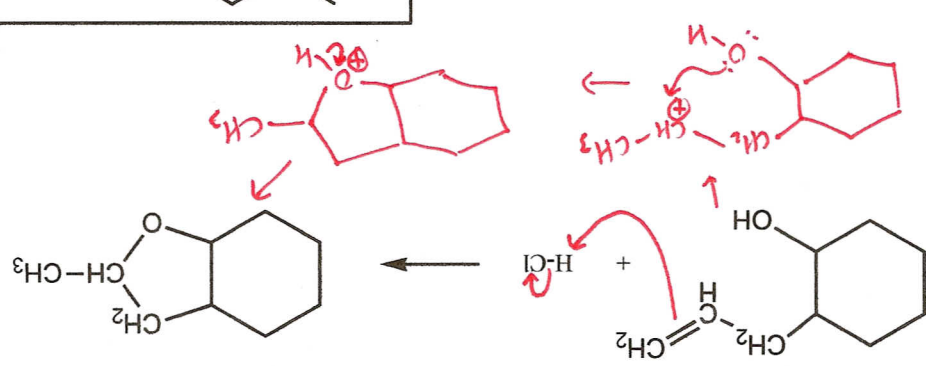


4.



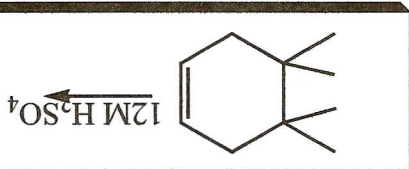
3 pts ea
12 pts total

III. Use curved arrow formalism to draw a plausible, step-by-step mechanism that accounts for the formation of the product shown. Show every step separately by drawing each likely intermediate.



8 pts
3 pts each, one best response for each question.
9 pts total

IV. Consider the reaction shown and circle the



1. The reaction was performed by adding the alkene to 12M H₂SO₄ at 0 deg C to give the alcohol. The

best next step in the procedure is:
wash the reaction mixture with water

extract the reaction mixture with methanol
add anhydrous sodium sulfate

extract with methylene chloride

place the reaction mixture in a close petri dish and heat

2. The reaction gives what product characteristics?

a single enantiomer is formed

a racemic mixture is formed

a single diastereomer is formed

a mixture of diastereomers is formed

a mixture of regioisomers is formed

a mixture of constitutional isomers is formed

3. When the alkene is the limiting reactant, what is the effect of using double the volume of 12M H₂SO₄?

no effect on the rate or the equilibrium

the rate is increased, but the position of the equilibrium is unchanged

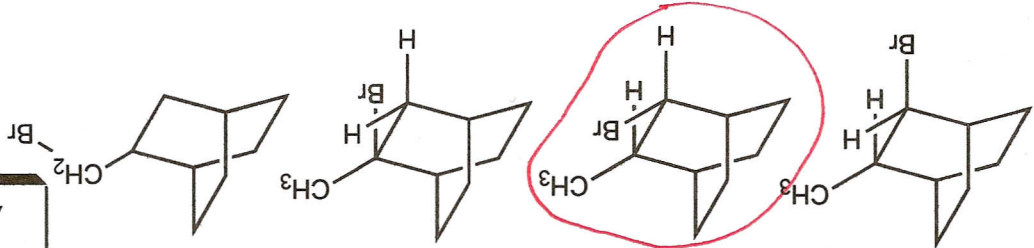
the rate is not affected, but more products are present at equilibrium

the rate is increased and more products are present at equilibrium

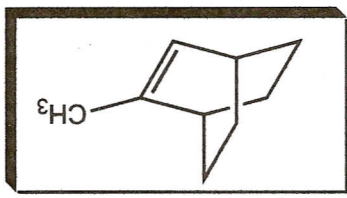
the rate is decreased and the position of the equilibrium is unchanged

IV. Answer each of the following by circling the best response.

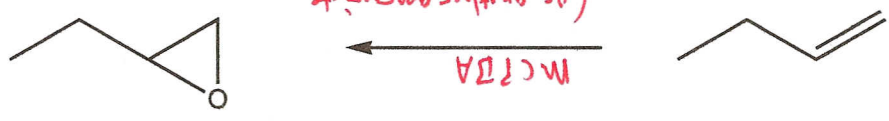
1. Which product is the result of both anti-Markovnikov addition and anti addition to the alkene shown?



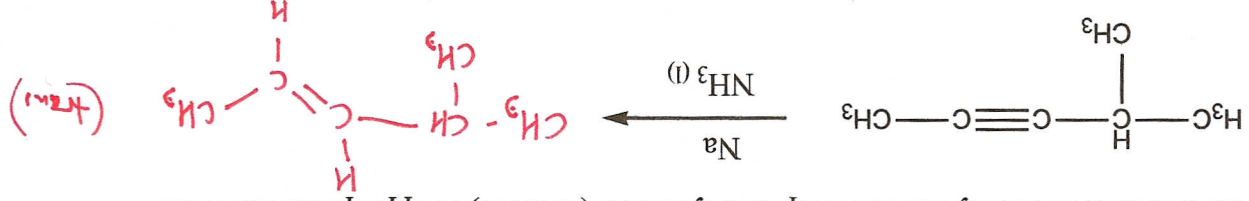
4 pts each
24 pts total



2.



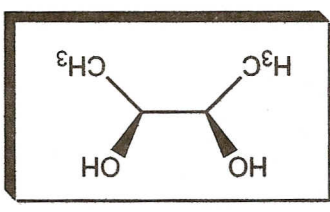
1.



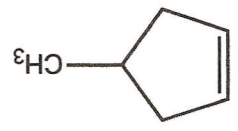
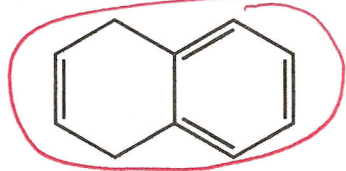
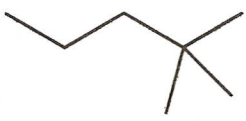
V. Fill in the structure of the missing product, or, fill in the structure of the missing starting material, or, fill in the reactants necessary for each step of a synthesis (in order) as appropriate for each.

5 pts. ea.
30 pts. total

E Z cis trans R S meso



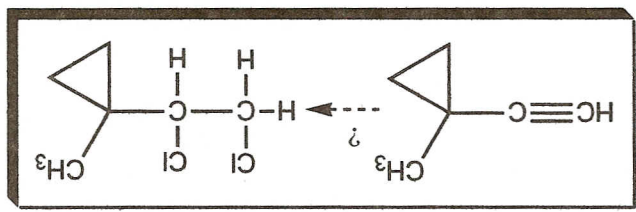
6. The stereochemistry shown in the compound is best classified as which one of the following?



5. Which compound is most likely to rearrange when treated with HCl?

H₂/Pd-C then NaCl
 Cl₂ then Li/NH₃(l)
H₂/Lindlar's catalyst then Cl₂

2 equivalents of HCl



4. Which conditions are best for the transformation shown?

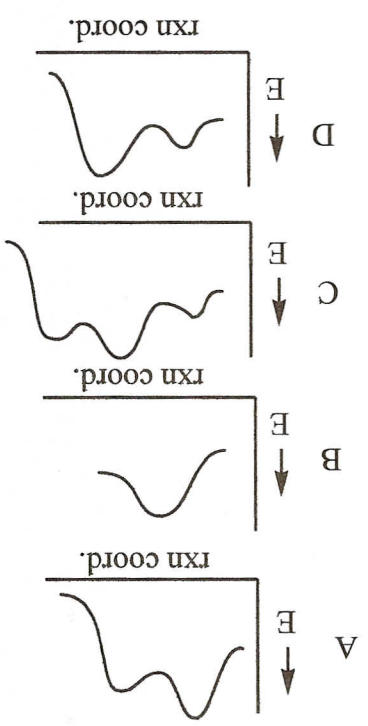
A B C D

Circle all letters that apply.

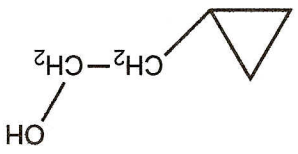
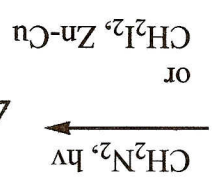
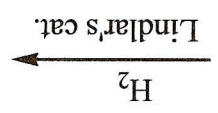
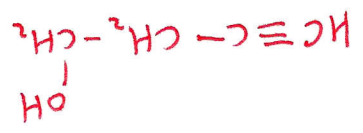
3. From the reaction energy diagrams shown, (A through D), which favors the reactants at equilibrium?

A B C D

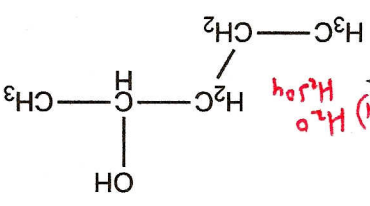
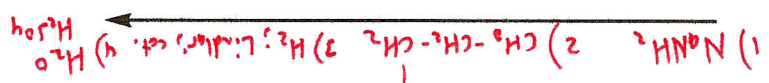
2. From the reaction energy diagrams shown, (A through D), which has two intermediates? Circle all letters that apply.



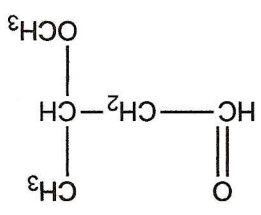
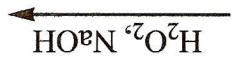
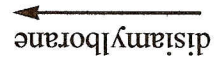
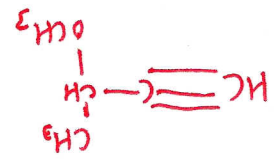
6.



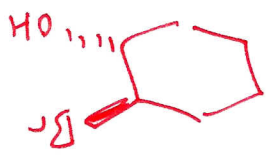
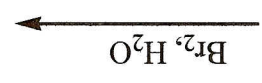
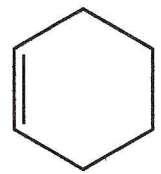
5.



4.



3.



anti-addition