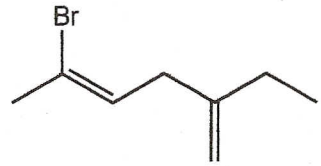
CHEM3411 fall 2009 test 2 Name: _____

107 pts available

4 pts ea
24 pt. total

I. Answer each of the following.

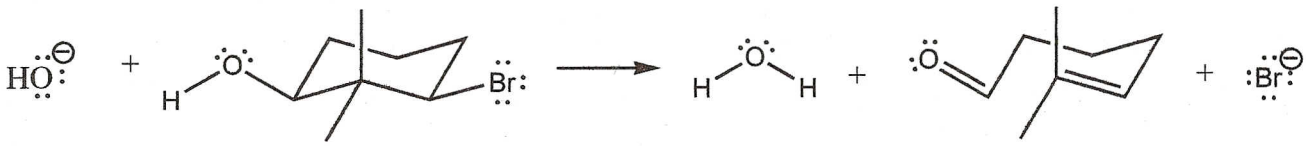
1. Give the IUPAC name. Include the geometry using E/Z designations..



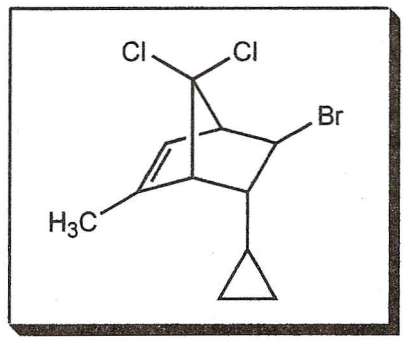
2. Draw the structure of R-3-methoxybut-1-yne

3. Draw the likely <u>organic intermediate</u> 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 <u>draw the appropriate curved arrows on the reactants</u> that would lead to the formation of the products shown..



5. Circle every chiral center in the compound shown.

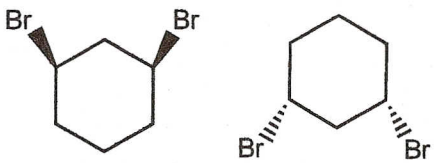


6. The antineoplastic agent mepitiostane is used to treat breast cancer. The specific rotation is +22.5 deg. What is the specific rotation of a 90:10 mixture of (+)-mepitiostane:(-)-mepitiostane?

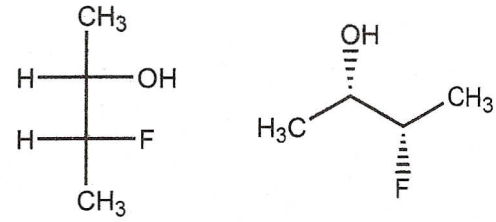
3 pts ea
2 pts tot.

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

1.

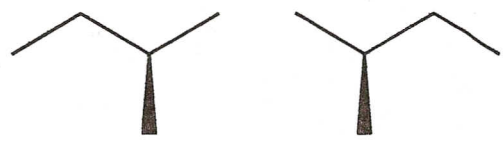


2.



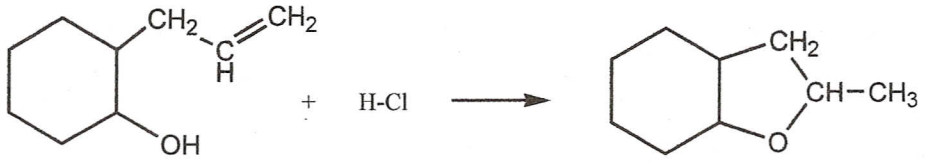
3.

4.



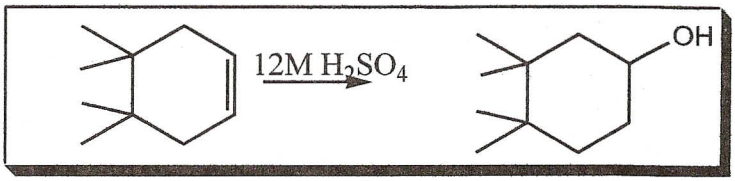
8 pts

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.



3 pts each, 9 pts total

IV. Consider the reaction shown and circle the one best response for each question..



1. The reaction was performed by adding the alkene to 12M H_2SO_4 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

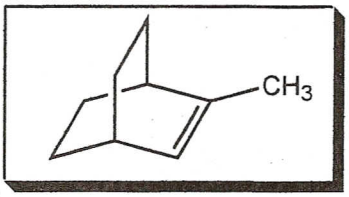
2. The reaction gives what product characteristics?
   - a single enatiomer is formed
   - a racemic mixture is formed
   - a single diastereomer is formed
   - a mixture of diastereomers is formed
   - a mixture of regioisomers is formed
   - a mixture of constitutional isomers is formed

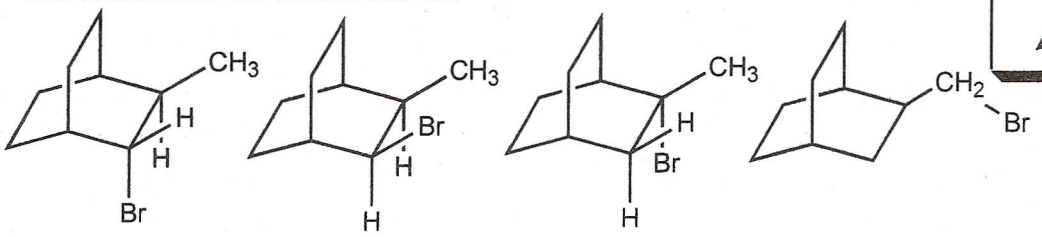
3. When the alkene is the limiting reactant, what is the effect of using double the volume of 12M H_2SO_4?
   - no effect on the rate or the equilibrium
   - the rate is increased, but the position of the equilibrium is unchanged
   - the rate is not affected, but more products are present at equilibrium
   - the rate is increased and more products are present at equilibrium
   - the rate is decreased and the position of the equilibrium is unchanged

4 pts. each, 24 pts tot

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

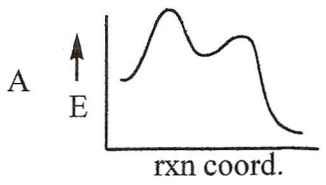
1. Which product is the result of both anti-Markovnikov addition and anti addition to the alkene shown?





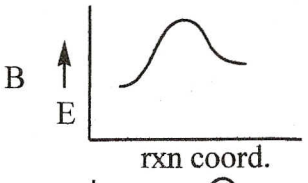
2. From the reaction energy diagrams shown, (A through D), which has two intermediates? Circle all letters that apply

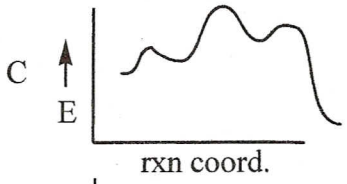
A B C D

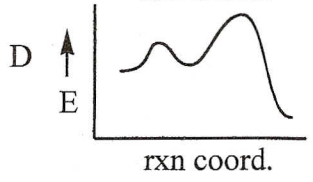


3. From the reaction energy diagrams shown, (A through D), which favors the reactants at equilibrium? Circle all letters that apply.

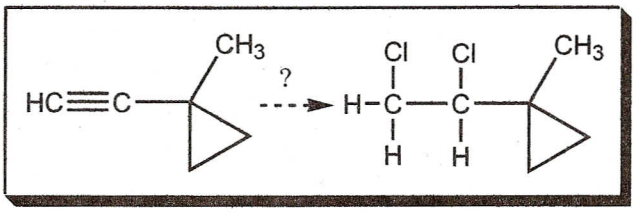
A B C D







4. Which conditions are best for the transformation shown?



2 equivalents of HCl

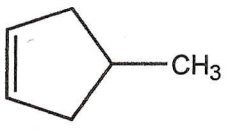
HCl then HCl/peroxides

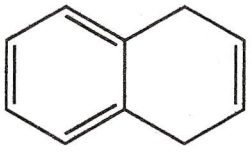
H_2/Lindlar's catalyst then Cl_2

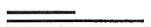
Cl_2 then $Li/NH_{3(l)}$

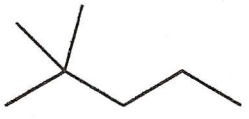
H_2/Pd-C then NaCl

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



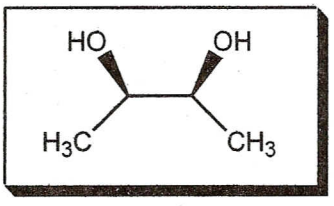






6. The stereochemistry shown in the compound is best classified as which one of the following?

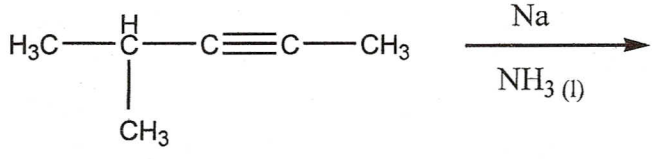
E Z cis trans R S meso



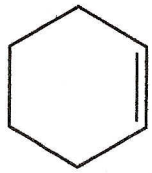
5 pts. ea. 30 pts tot.

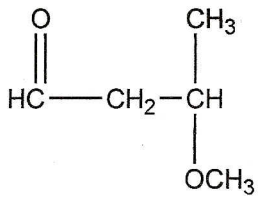
V. Fill in the structure of the missing product, or, fill in the structure of the missing starting material, or, fill in the reactants necessary for each step of a synthesis (in order) as appropriate for each.

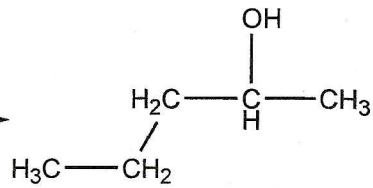
1.



2.

3.  $\xrightarrow{Br_2,\ H_2O}$

4. $\xrightarrow{\text{disiamylborane}}$ $\xrightarrow{H_2O_2,\ NaOH}$ 

5. $HC{\equiv}CH$ $\longrightarrow$ 

6. $\xrightarrow[\text{Lindlar's cat.}]{H_2}$ $\xrightarrow[\text{or } CH_2I_2,\ Zn\text{-}Cu]{CH_2N_2,\ hv}$