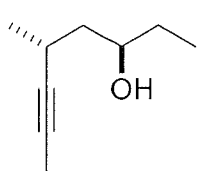


December 4, 2012

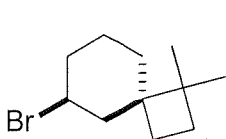
In-class # \_\_\_\_\_

Name Key  
(Last, First)

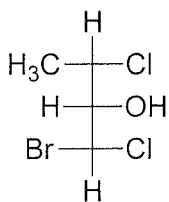
1. Name the following compounds. Do not forget stereochemistry. (23 pts)



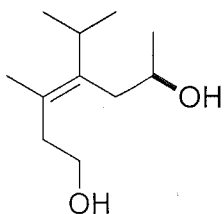
<sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup>  
(3R,5R)-5-methyl-1-octyne-3-ol



<sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup>  
(4R,6S)-6-bromo-1,1-dimethylspiro[3.5]nonane

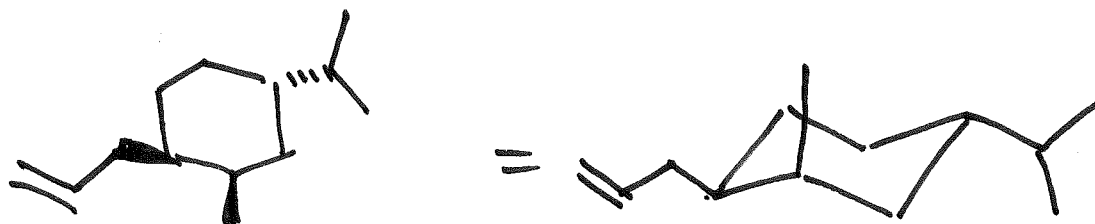


<sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup>  
(1S,2S,3R)-1-bromo-1,3-dichlorobutan-2-ol



<sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup> <sup>+</sup>  
(R,E)-4-isopropyl-3-methylhept-3-ene-1,6-diol

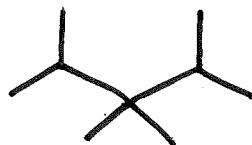
2. Draw (1R,2R,4S)-1-allyl-4-isopropyl-2-methylcyclohexane in its most stable chair conformation. (5 pts)



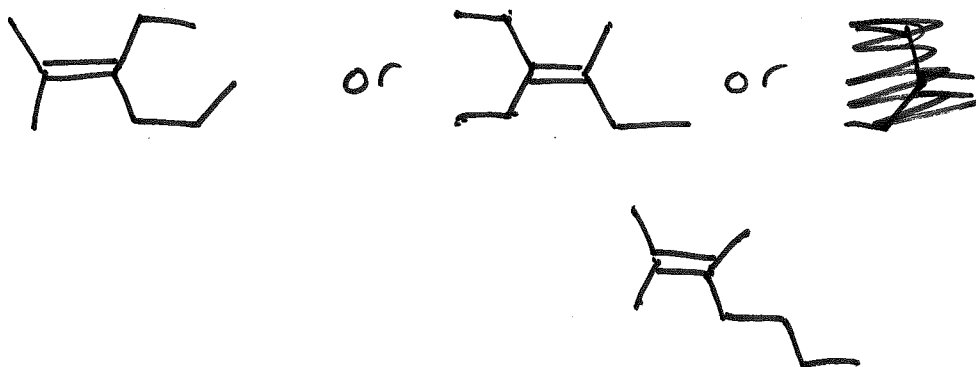
3. Draw a meso compound with the molecular formula  $C_9H_{20}$ . (3 pts)



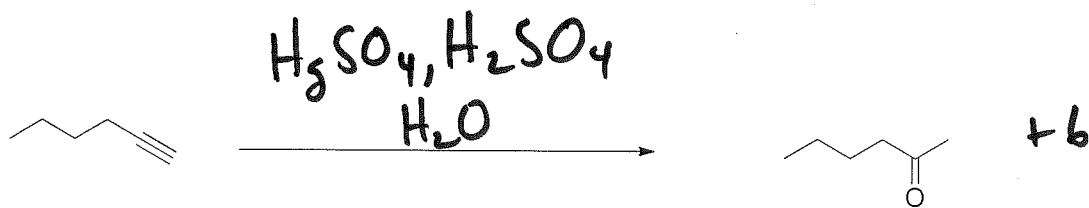
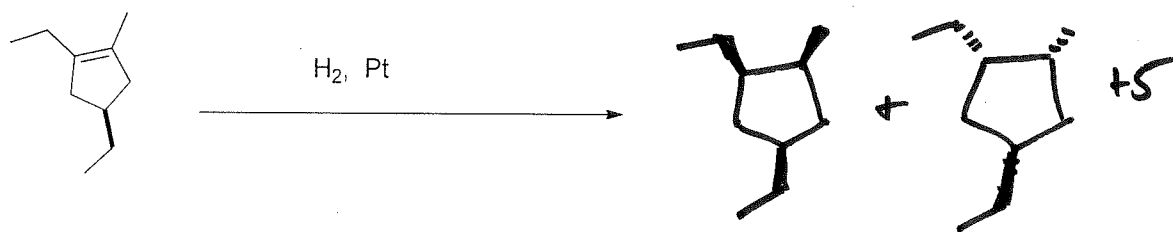
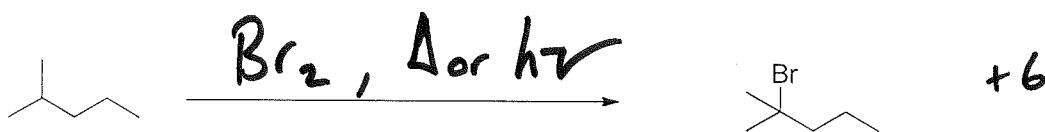
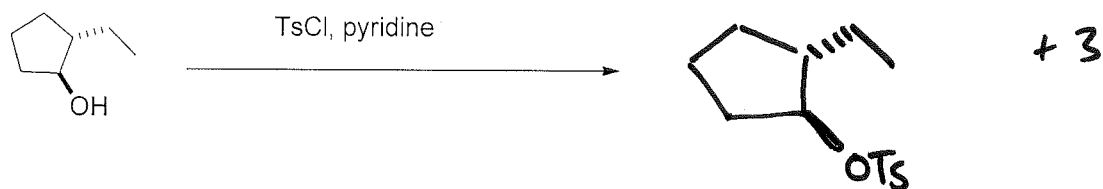
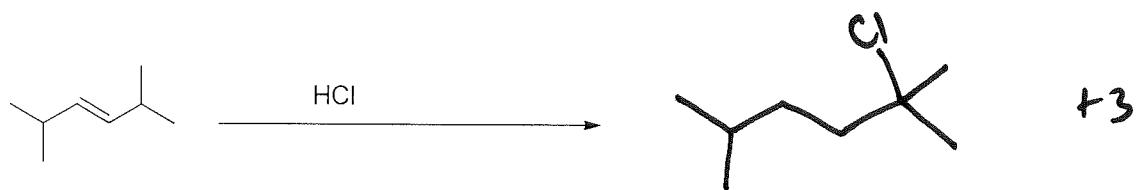
4. Draw a structural isomer of  $C_9H_{20}$  in which only three different monochlorinated products could be formed in a radical chlorination reaction. (3 pts)



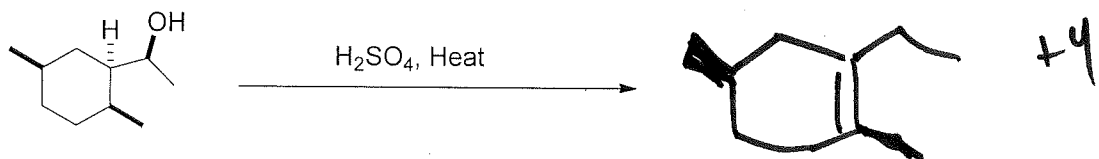
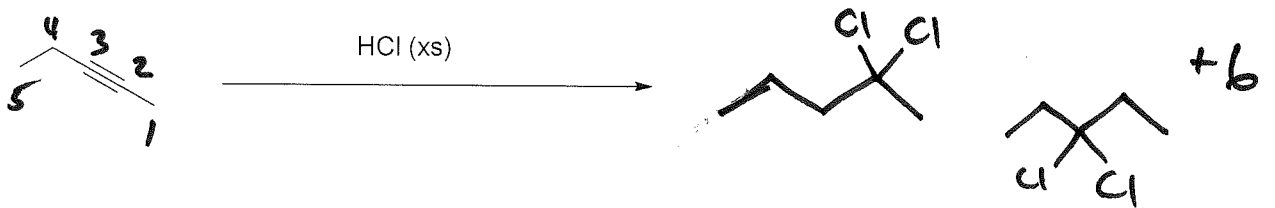
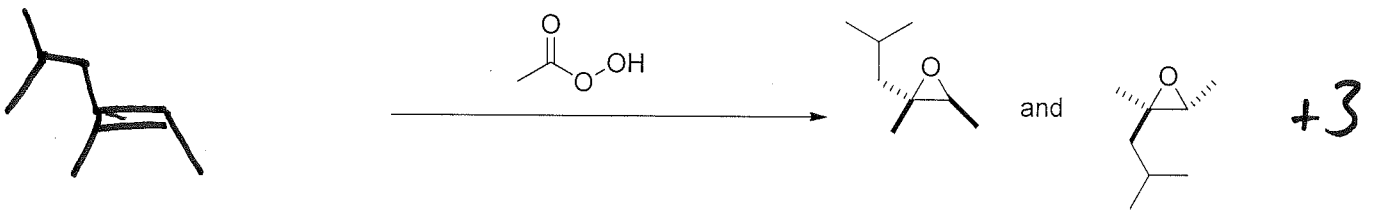
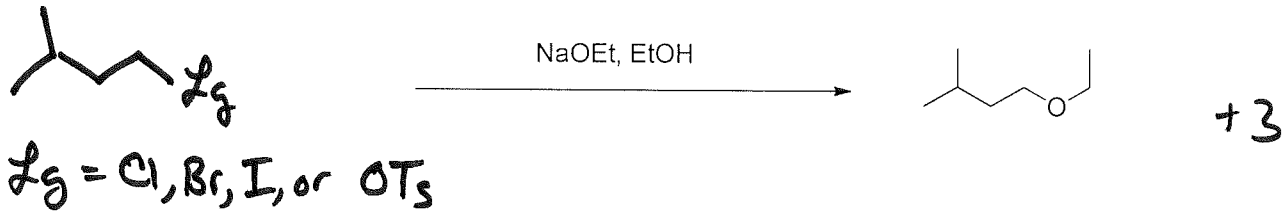
5. Draw a **tetra substituted** alkene with the molecular formula  $C_9H_{18}$  that has no stereochemistry (No R, S, E or Z). (2 pts)



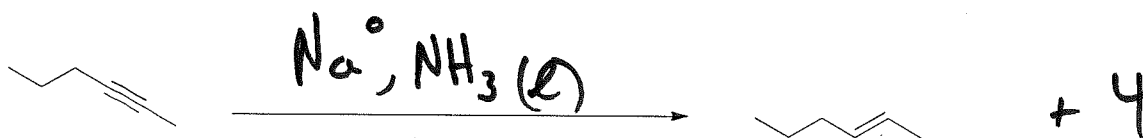
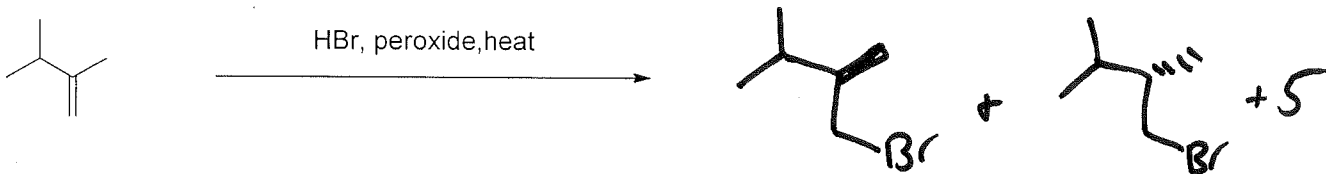
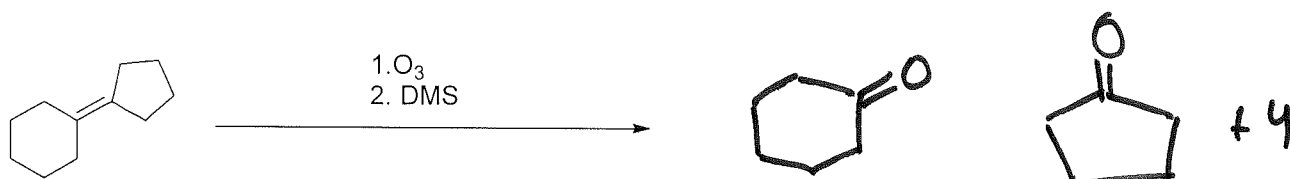
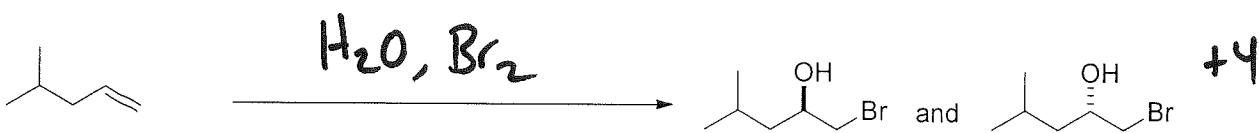
6. Draw the necessary reagents, starting material, or product/s for the following chemical transformations. If there is no reaction, write no reaction. (61 points)



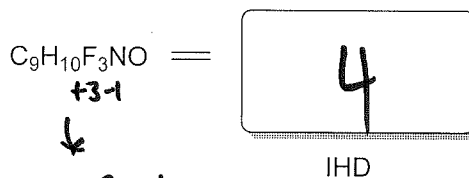
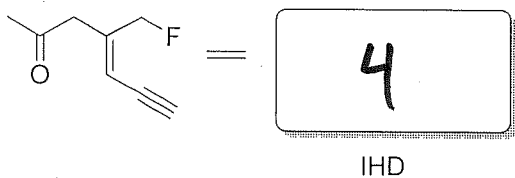
6. continued



69. Continued.

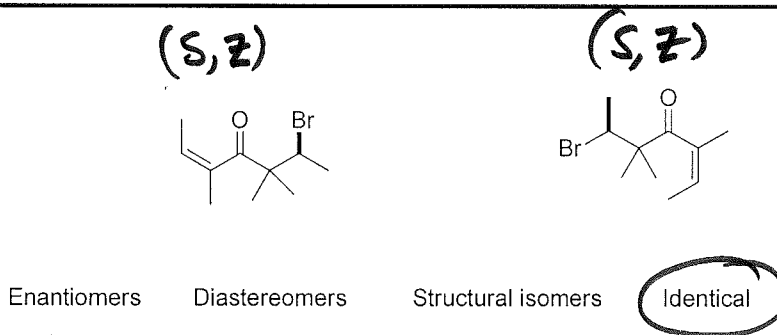
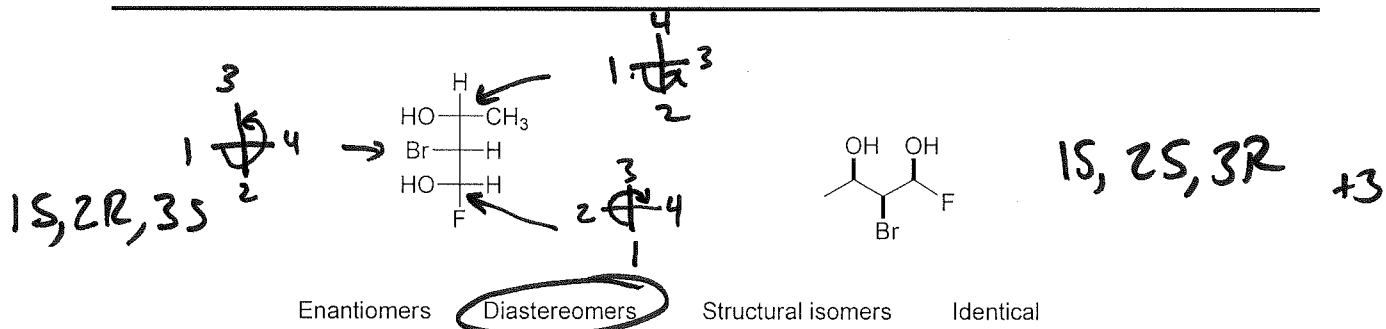
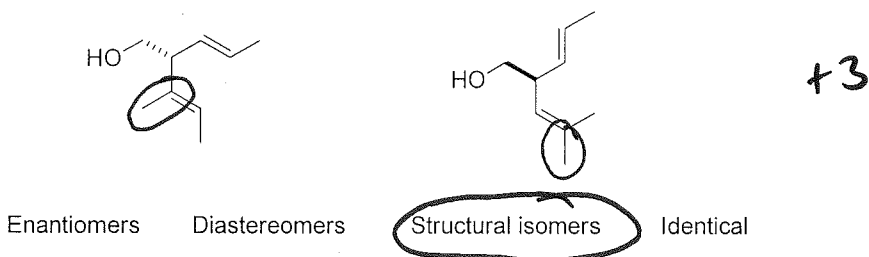


70. What is the IHD or degrees of unsaturation for the following compounds? (6 pts)



$$\begin{array}{r} \text{C}_9\text{H}_{20} \\ \text{H}_{12} \\ \hline 8/2 = 4 \end{array}$$

8. How are the following molecules related? Circle your answer. (9 pts)

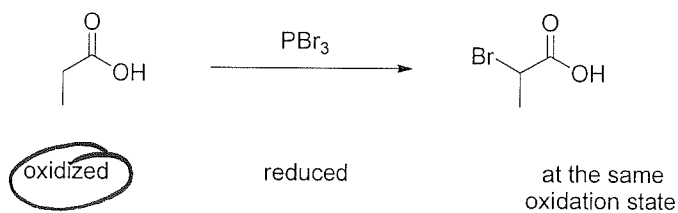


a. Draw, in a Newman projection looking down the C3-C4 bond, the most stable staggered conformation of (3R,4S)-3-fluoro-2,4,6-trimethylheptane. (7 pts)

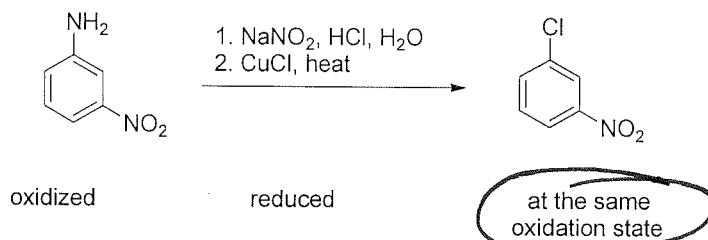


(3R,4S)-3-fluoro-2,4,6-trimethylheptane

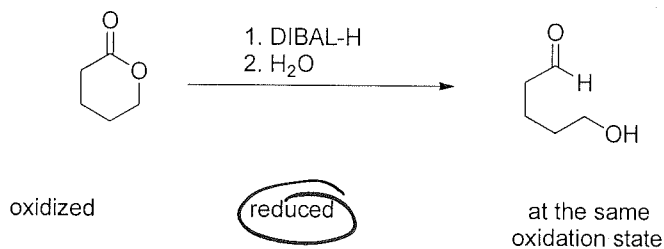
In the following reactions, has the product been oxidized, reduced, or are there the starting material and the products at the same oxidation state. (9 pts)



+3



+3

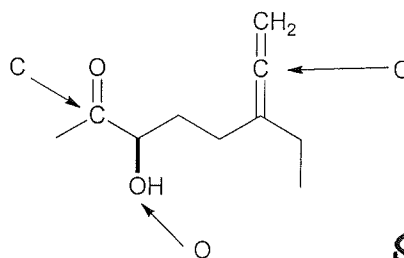


+3

What is the hybridizations, shape, and bond angle at the indicated atom. (9 pts)

You may use the abbreviations: Tet = tetrahedral: TP = trigonal planar: L = linear

Hybridization: sp<sup>2</sup>  
 Shape: TP  
 Bond angle: 120°



Hybridization: sp  
 Shape: L  
 Bond angle: 180°

Hybridization: sp<sup>3</sup>

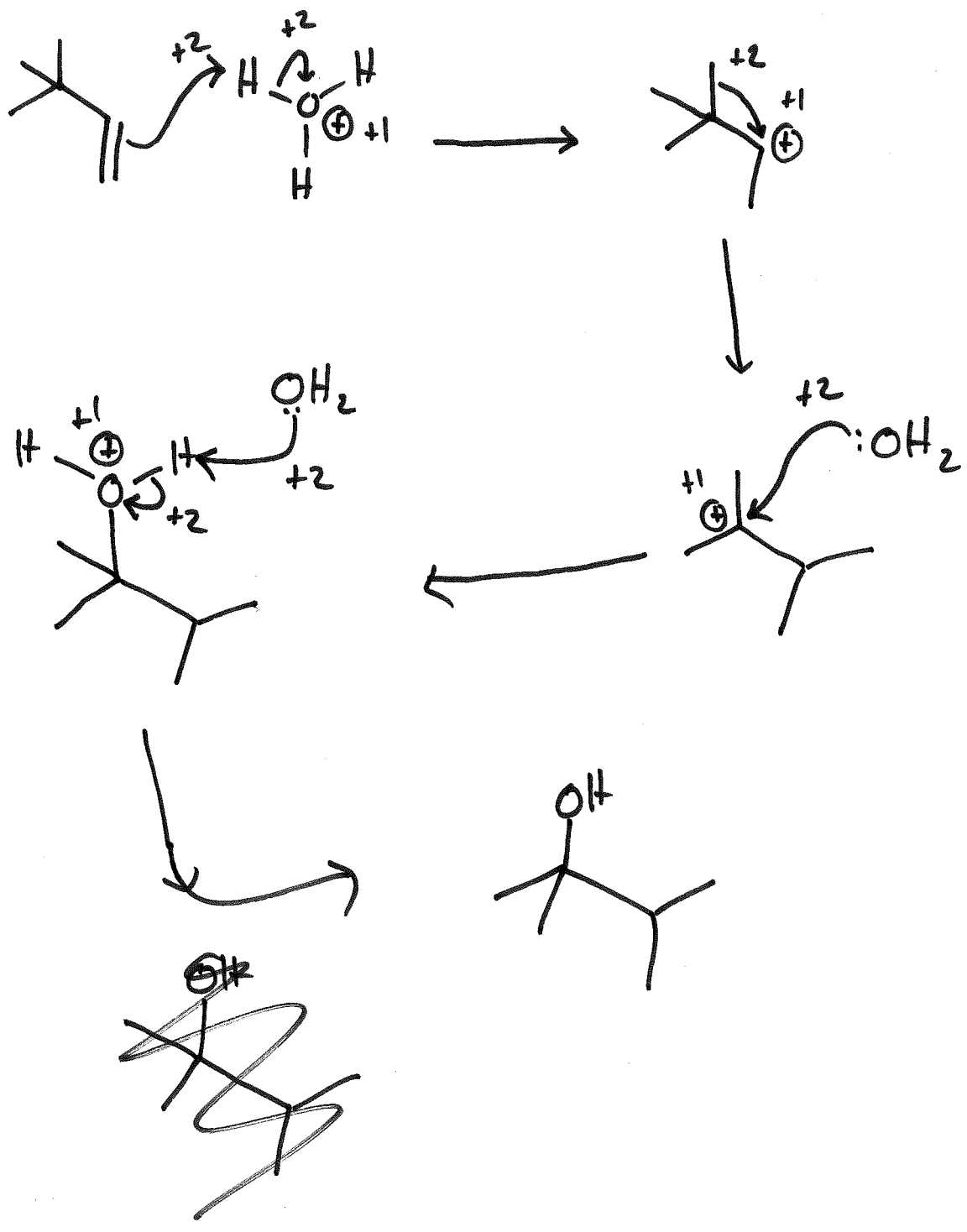
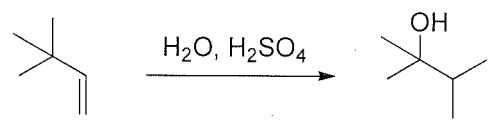
Shape: Tet/bent

Bond angle: < 109°

VSEPR

12

Draw the mechanism for the following hydration reaction. (16 pts) 151





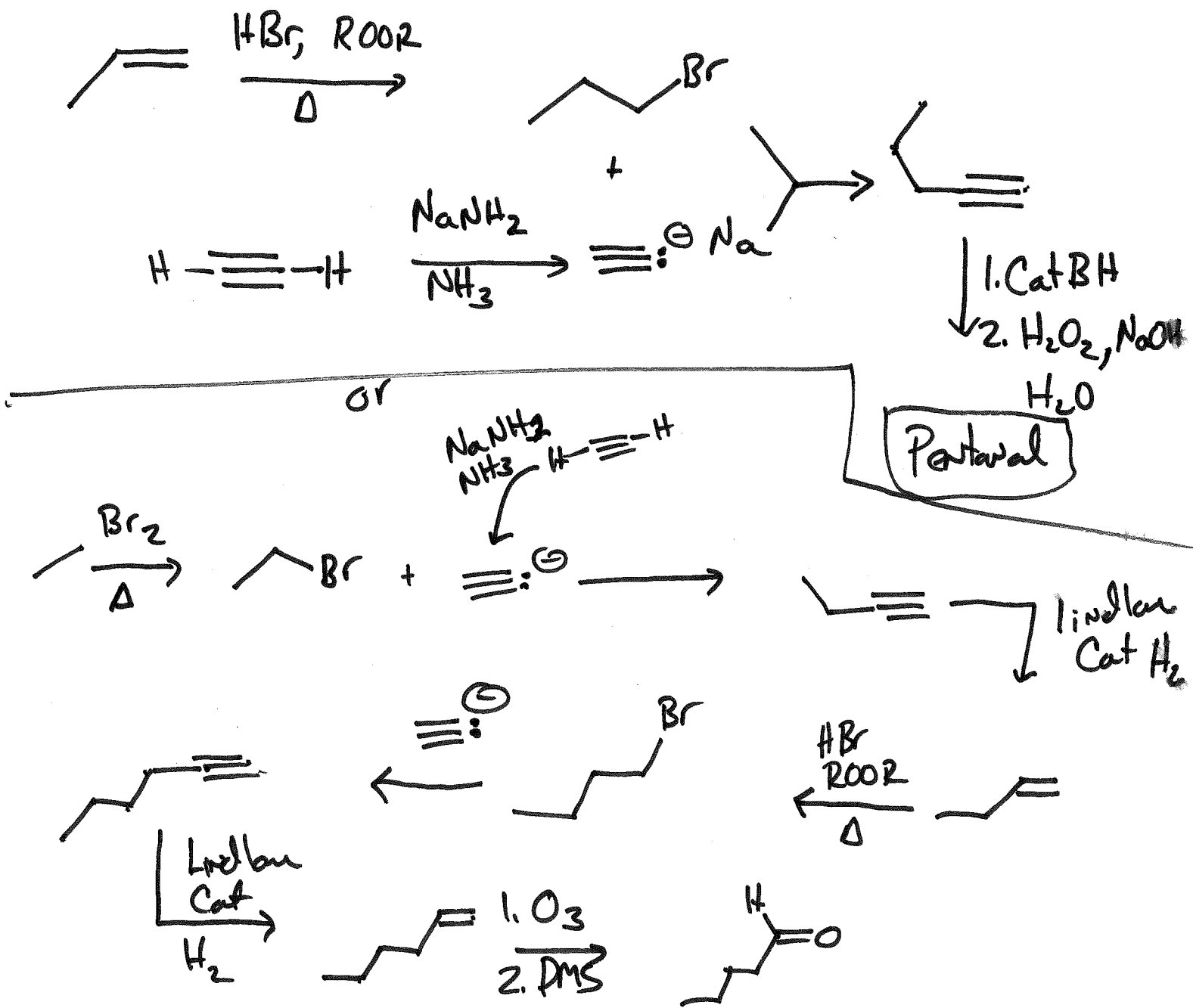
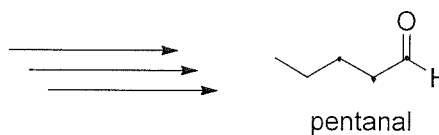
13

Provide a synthesis of pentanal. All carbons in the product must start from an alkane, alkene, or alkyne that has THREE carbons or less. You may use any reagents or conditions you have learned in CH 334. The major product of each step is then carried on to the following reaction. (12 points)

No starting with an alkane, alkene, or alkyne that has a halogenated or an alcohol on it.

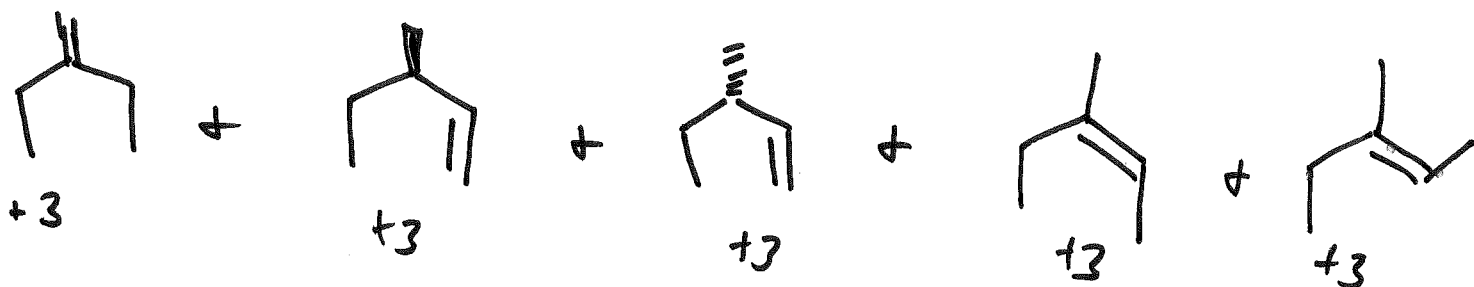
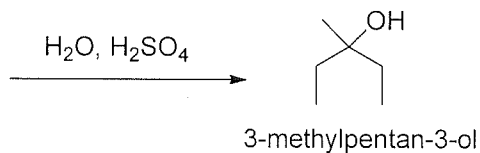
All carbons in the product **must start** from an alkane, alkene, or alkyne that has THREE carbons or less

You may use any reagents or conditions you have learned in CH 334

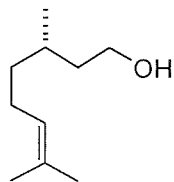


14

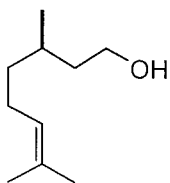
8. Draw all the potential starting alkenes that could have been in an acid catalyzed hydration reaction which would yield 3-methylpentan-3-ol. (15 pts)



\*\*\*\*\*Insurance Question 8 pts\*\*\*\*\*



(S)-Citronellol has an optical rotation of  $[\alpha]_D = -5.3$



(R)-Citronellol has an optical rotation of  $[\alpha]_D = +5.3$

1. What is the optical rotation of a 1:1 mixture of (S)-Citronellol and (R)-Citronellol (1 pts)

0

2. What is the term used for a 1:1 mixture of enantiomers? (2 pts)

Racemic

3. If we had an enantiomeric excess of 64% in favor of (S)- Citronellol, what percent of the mixture is S and R? (4 pts)

% (S)- Citronellol = 82

% (R)- Citronellol = 18

4. (R)- Citronellol is .... (1 pt) Circle your answer

dextrorotatory

levorotatory