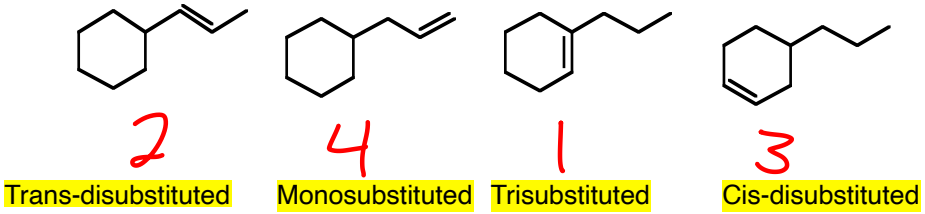
JASPERSE CHEM 350 TEST 3 VERSION 3 Answers
Ch. 7 Structure and Synthesis of Alkenes
Ch. 8 Reactions of Alkene
The number of points per problem is indicated in parentheses following each problem.

1. Rank the following alkenes in order of stability, 1 being most stable, 4 being least stable. (4)



2 Trans-disubstituted | 4 Monosubstituted | 1 Trisubstituted | 3 Cis-disubstituted

2. Determine the number of elements of unsaturation for C_5H_7ClO. (3)

EU = 2

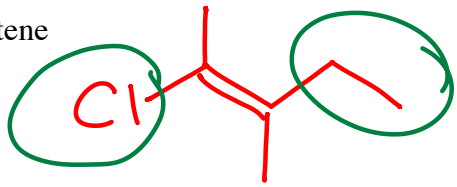
Theory: 12 H + halogen
Actual: 8 H + Cl
4 short ÷ 2 = 2 EU

Halogen is equivalent to a hydrogen, both use up one single-bond.

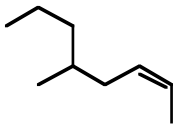
3. Give the proper IUPAC name or the structure for the following compounds. (4 points each)

a. (E)-2-chloro-3-methyl-2-pentene

Cl > CH3 on left alkene carbon

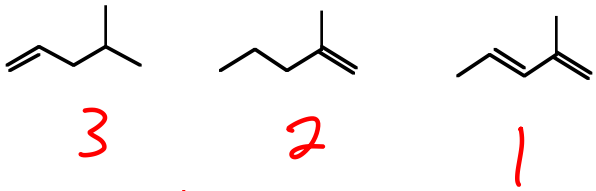


b.



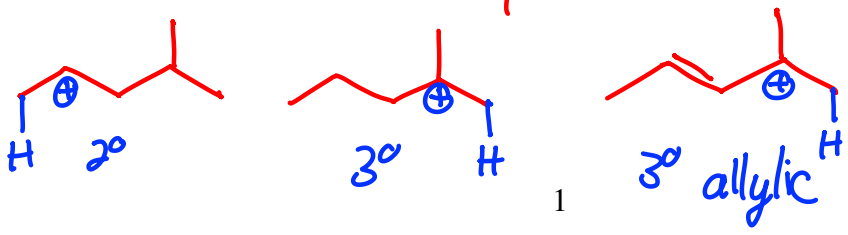
(Z)-5-methyloct-2-ene
or cis-

4. Rank the reactivity of the following alcohols towards HBr, 1 being the fastest reactant, 3 being the slowest reactant. (3 points)

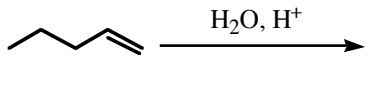


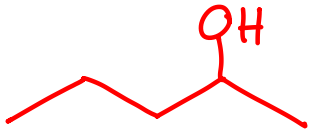
3 2 1

Cation stability following protonation (such that the best possible cation can form.)

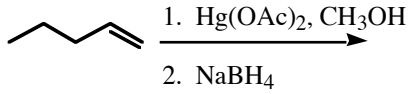


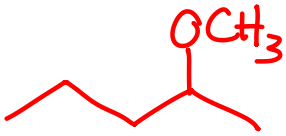
5. Predict the major product for the following reactions. You needn't bother to show any side products or minor products. Pay careful attention to orientation. (3 points each)



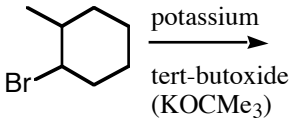


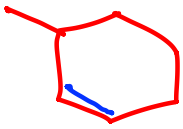
Markovnikov



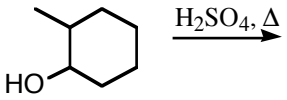


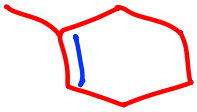
Markovnikov.
Ether not alcohol





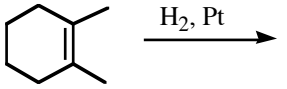
Bulky base, results in E2 not SN2, and results in Hofmann orientation, not Zaytsev

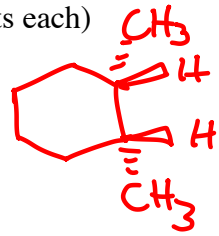




Zaytsev

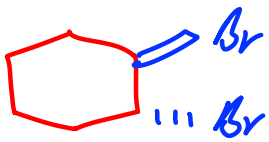
6. Predict the major product in each of the following reactions. Pay careful attention to stereochemistry! (3 points each)



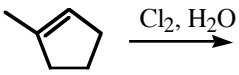


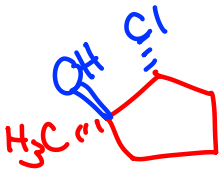
Cis

Note: For chiral products, I'm just drawing one of the two enantiomers. Either is fine. Understand that if chiral, both enantiomers will form.

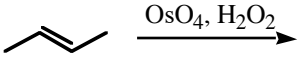


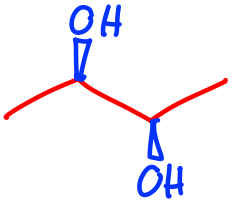
Trans





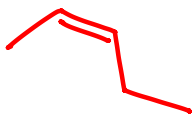
Trans, Markovnikov





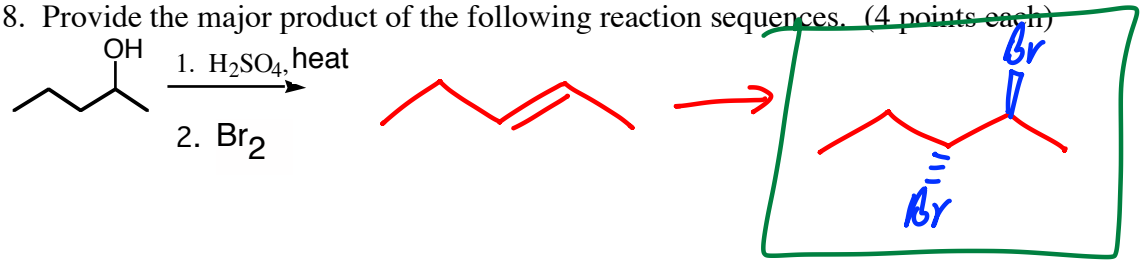
Cis

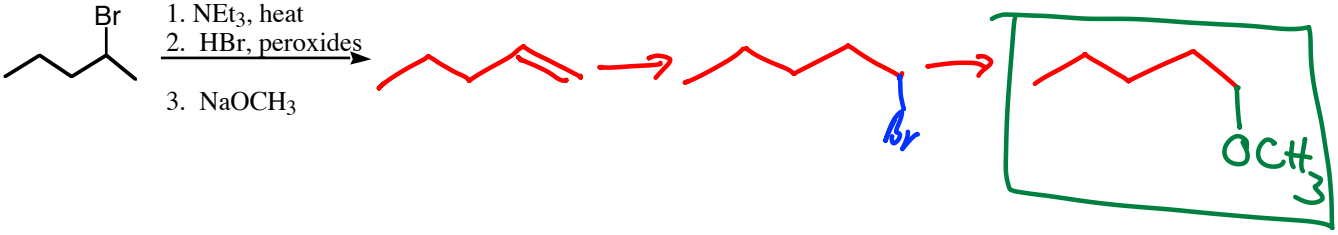
7. Fill in the starting reactant. (4 points each)

or 

Z, not E alkene.
The mechanism of addition is trans, so to result in the "cis look" of the product as drawn, a bond rotation was required.
The product-look and the mechanism of addition are mismatched.

8. Provide the major product of the following reaction sequences. (4 points each)





9. What is a possible structure for a molecule **A** given the following: (6 points)

a. is has the formula C_6H_{10} EU=2

b. it reacts with H_2/Pt to give a product with formula C_6H_{12} 1 Alkene

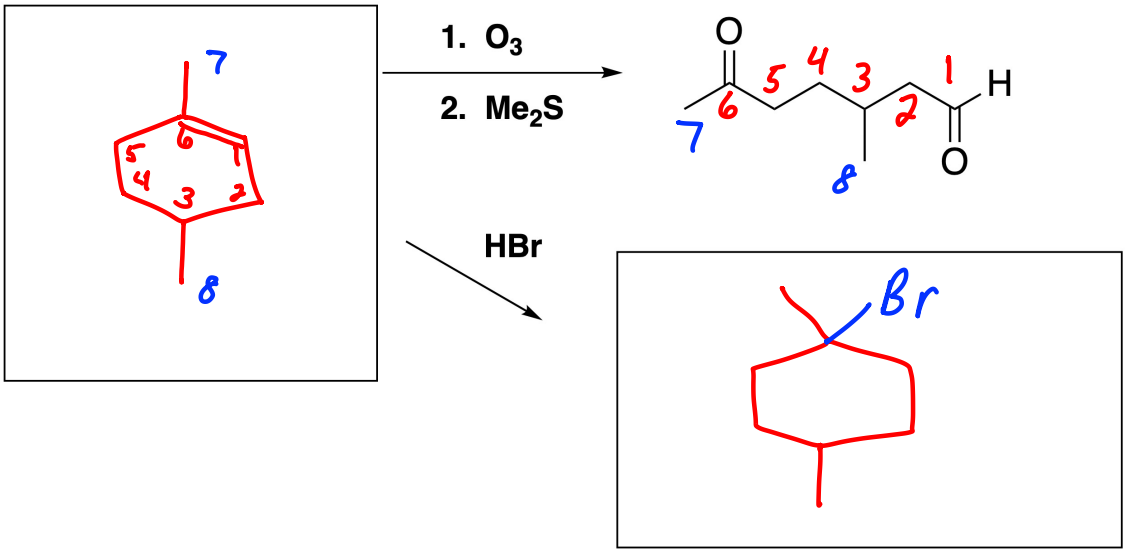
c. upon ozonolysis (O_3; Me_2S) it gives two products, CH_2=O and a product C_5H_8O.

Must have an alkene with $=CH_2$ on end

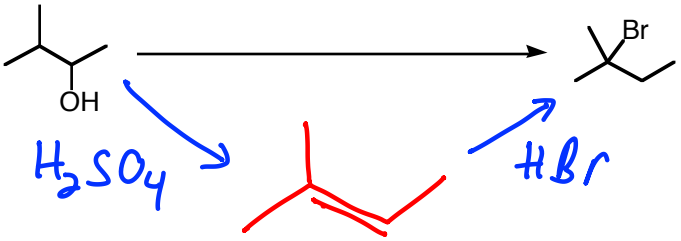
 etc

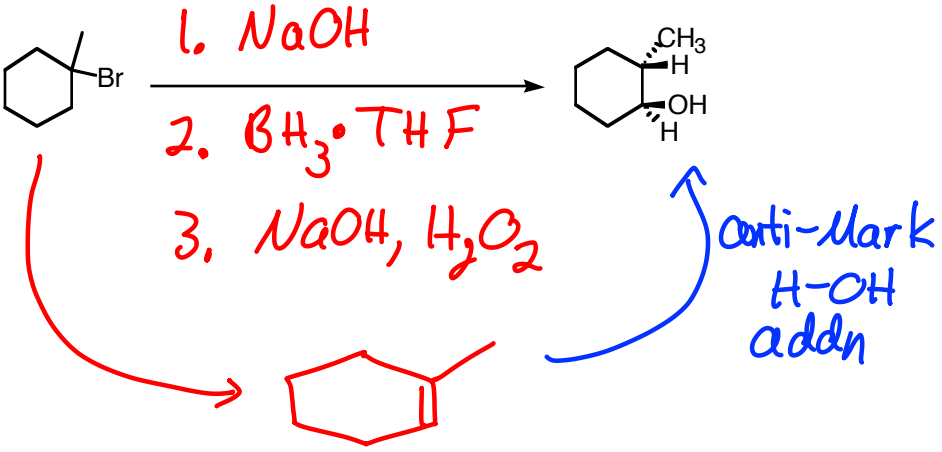
Many answers possible.
But, must have the following:
1. One alkene
2. One ring
3. An alkene with CH2 on end

10. Fill in the boxes. (6 points total)

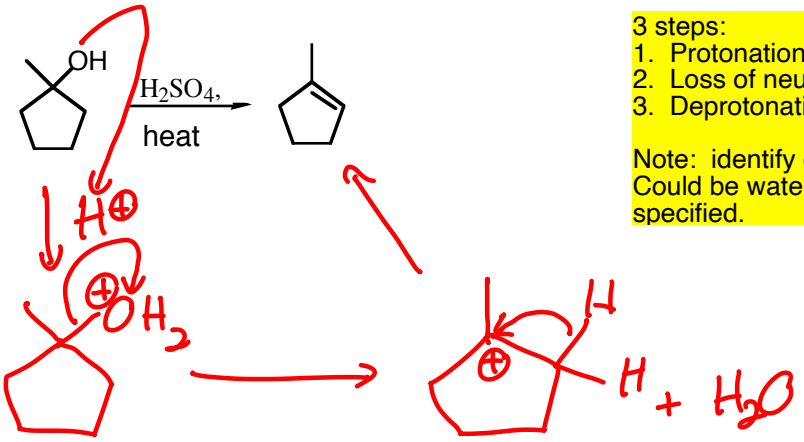


11. Provide reagents to accomplish the following transformations. (6 points each)



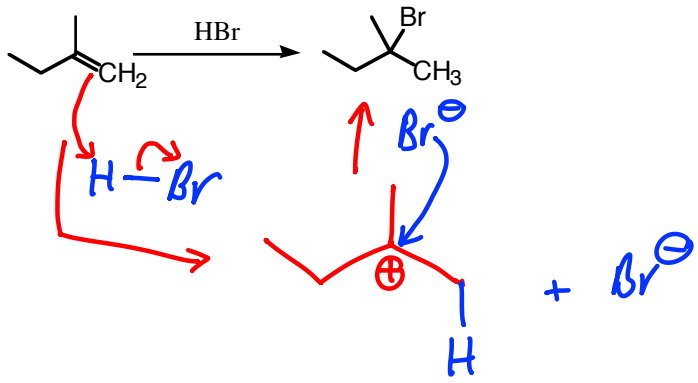


12. Draw the mechanisms for the following reactions. Be sure to draw all intermediates, and try to correctly draw "electron-movement" arrows. (8 points for the first, 6 points for the second)



3 steps:
1. Protonation
2. Loss of neutral water
3. Deprotonation

Note: identify of agent who grabs the H in step 3 Could be water or HSO4-anion. I don't need that to be specified.



13. Draw as many isomers as you can for alkenes with formula C_5H_{10}. (8 points. 2 points off for each duplicate or each possible isomer not drawn.)

EU = 1.
Problem wording specifies "alkene"