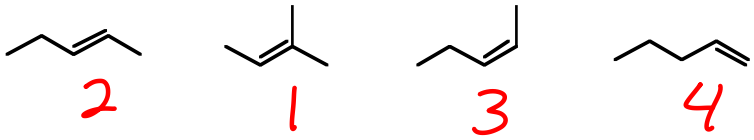
JASPERSE CHEM 350 TEST 3 VERSION 4

Ch. 7 Structure and Synthesis of Alkenes
Ch. 8 Reactions of Alkenes

Answers

1. Rank the following alkenes in order of stability, 1 being most stable, 4 being least stable. (3 points)



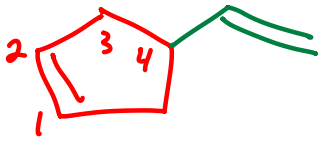
Tri-subbed > di > mono
Trans > cis

2. Determine the number of elements of unsaturation for C_5H_8O. (2 points)

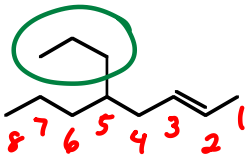
2

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

a. 4-vinylcyclopentene

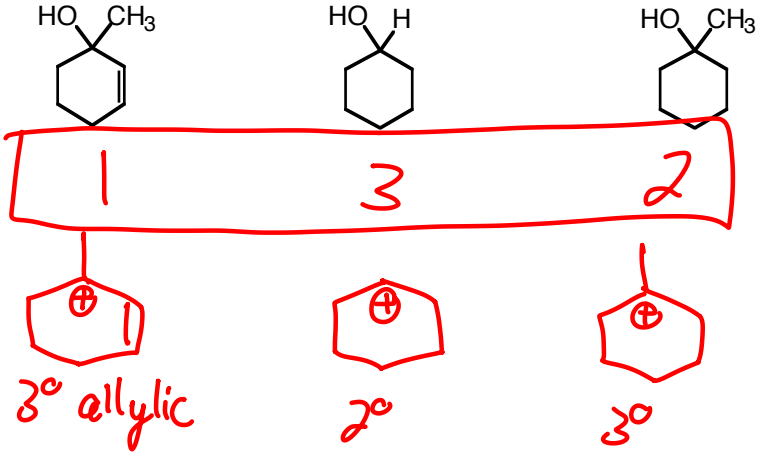


b.



(E)-5-propyloct-2-ene
Or trans-

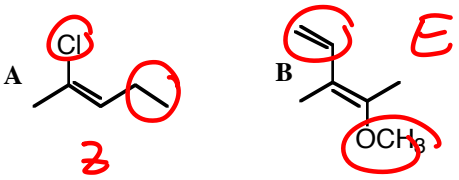
4. Rank the reactivity of the following alcohols towards H_2SO_4/Δ catalyzed dehydration, 1 being
the fastest reactant, 3 being the slowest reactant. (3 points)



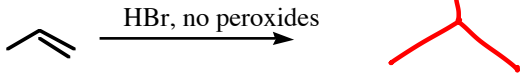
Cation Stability Explains

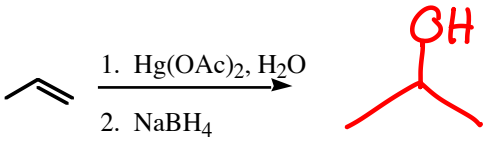
5. Which of the following statements is true for the structures shown: (3 points)

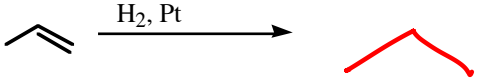
a. **A** is Z and **B** is Z
b. **A** is Z and **B** is E
c. **A** is E and **B** is Z
d. **A** is E and **B** is E

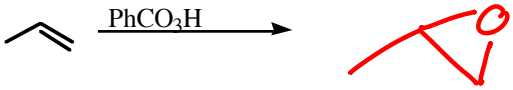


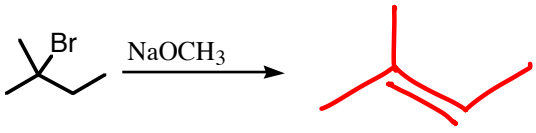
6. Predict the major product for the following reactions. You needn't bother to show any side products or minor products. Pay careful attention to orientation, which is important in many of these problems. (3 points each)

a. 

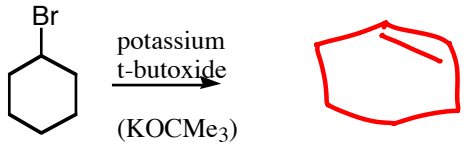
b. 

c. 

d. 

e. 

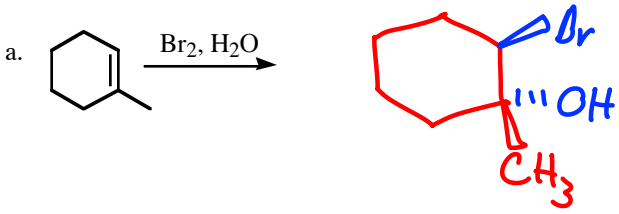
Zaytsev

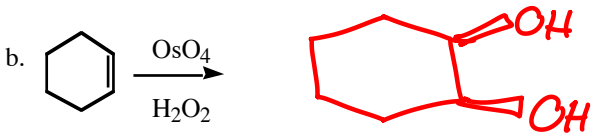
f. 

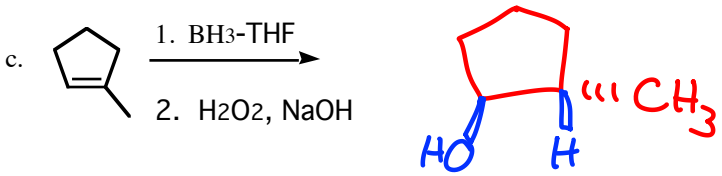
Bulky base, goes E2 over SN2

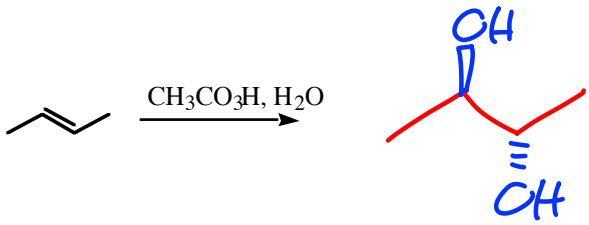
7. Predict the major product in each of the following reactions. Pay careful attention to stereochemistry: stereochemistry is involved in each of these problems! (3 points each)

Note: For chiral products I just drew one of the two enantiomers. Either is fine. You should be aware that both form, but as time-saver we usually only draw one

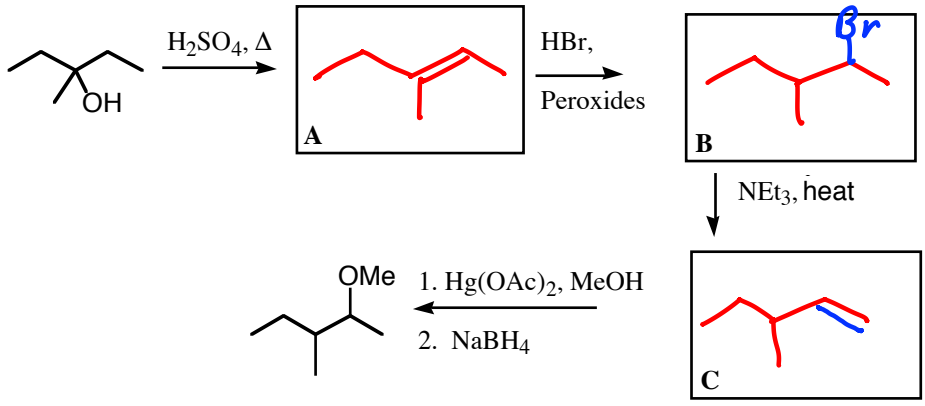
a. 

b. 

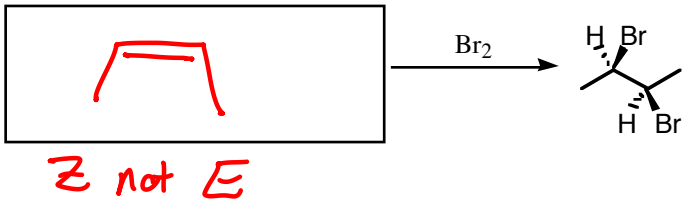
c. 

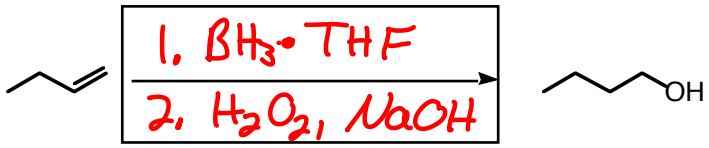
d. 

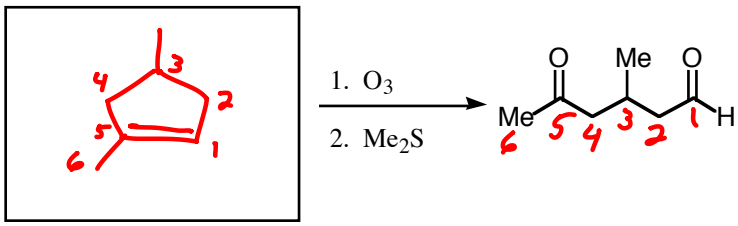
8. Fill in the intermediates in the following transformation. (3 points each)



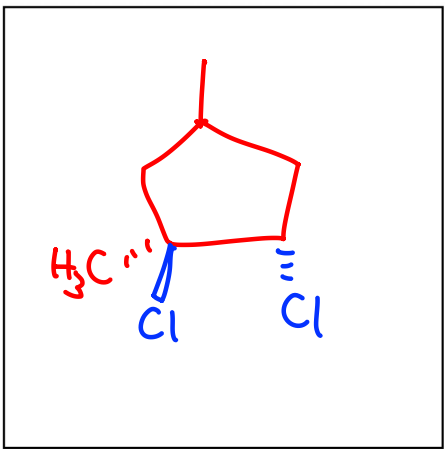
9. For the following reactions, fill in the missing <u>starting materials</u>, <u>reagents, or products</u>. (3 points each)

a. 

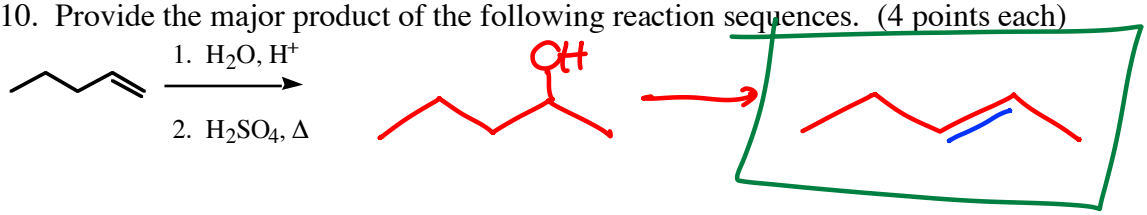
b. 

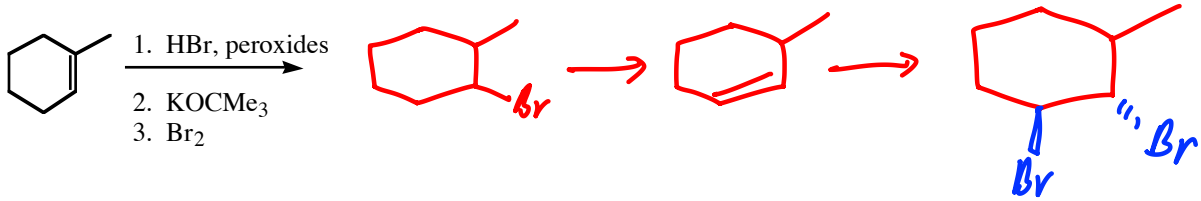
c. 

Cl_2

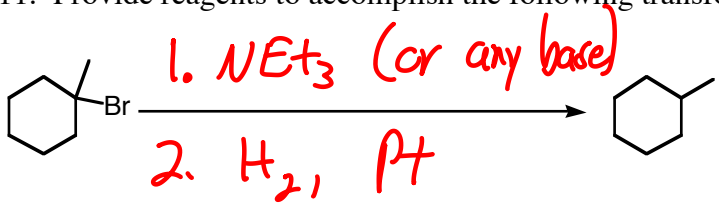
d. 

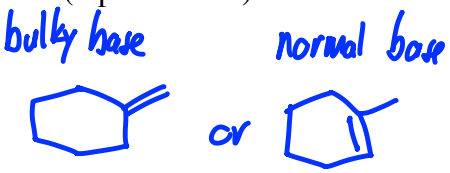
10. Provide the major product of the following reaction sequences. (4 points each)



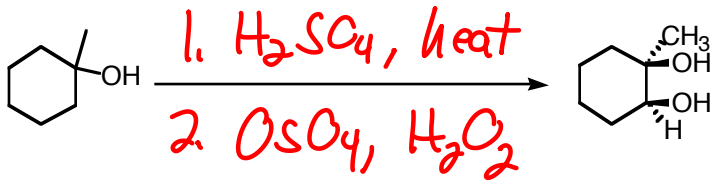


11. Provide reagents to accomplish the following transformations. (4 points each)

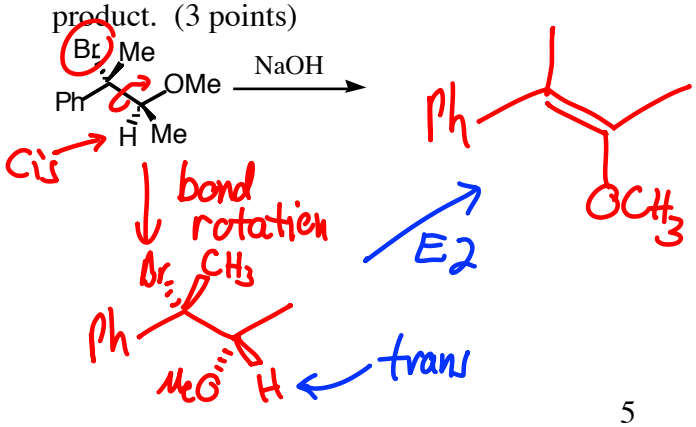




Either alkene could hydrogenate to the product shown. So, whether you use a bulky base or a normal base, doesn't really matter.

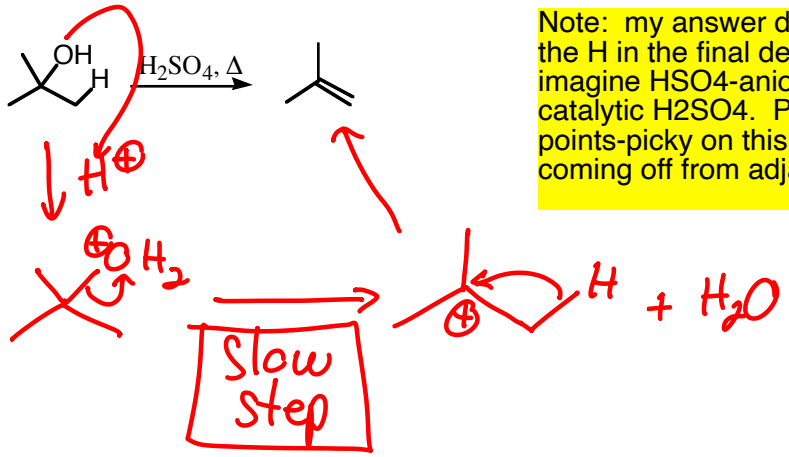


12. Provide the product for the following reaction. Be sure to show the stereochemistry of the product. (3 points)



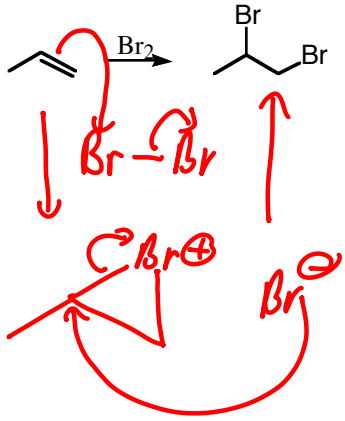
Very trick one! Notes:
1. 3° R-Br required E2, not SN2.
2. But, E2 requires a trans H.
3. In the original figure, the H is cis, not trans.
4. Bond rotation can happen to spin the H into the trans position, enabling E2 elimination and leading to the resulting stereochemistry.

13. Draw the mechanism for the following reaction, and write "slow" next to the rate determining step. Be sure to draw all intermediates, and to correctly draw "electron-movement" arrows or half-arrows. (4 points)



Note: my answer doesn't specify who actually grabs the H in the final deprotonation step. One could imagine HSO4-anion doing that, to regenerate catalytic H2SO4. Probably water does. I won't be points-picky on this, so long as you show an H coming off from adjacent carbon.

14. Draw the mechanism for the following reaction. Be sure to draw all intermediates, and to correctly draw "electron-movement" arrows or half-arrows. (4 points)



In practice, the bromide does attack the more substituted carbon of the bromonium ion ring, because the more substituted carbon has more partial-positive charge on it.

15. Formula: C_4H_8 1 EU

Reactivity: reacts with H_2/Pt to give C_4H_{10} 1 alkene, no rings

DRAW ALL POSSIBLE ISOMERS, INCLUDING STEREOISOMERS. (4 isomers are possible!) (5 points)