

JASPERSE CHEM 350 TEST 3  
 Ch. 7 Structure and Synthesis of Alkenes  
 Ch. 8 Reactions of Alkenes

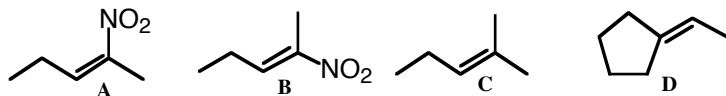
## VERSION 1

1. How many elements of unsaturation are in the formula  $C_6H_9NO_2$ ? (3 points)

- a. 0b. 1 c. 2 **d. 3** e. 4 f. 5 g. 6

$$(14+1) - 9 = 6H$$

2. For the three structures shown, which of the statements is true? (3 points)

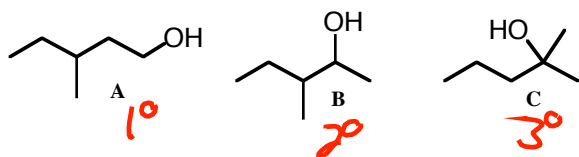


- a. A, C, and D are Z; B is E  
 b. A and B are the only Z compounds  
**c. A is the only Z compound; B is the only E compound**  
 d. B, C, and D are Z; A is E  
 e. B is the only Z compound; A is the only E compound

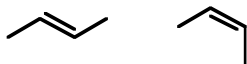
3. Rank the reactivity of the following toward  $H_2SO_4/\hat{I}$  catalyzed dehydration. (3 points)

- a. **A** is fastest; **C** is slowest  
 b. **B** is fastest; **C** is slowest  
 c. **A** is fastest; **B** is slowest  
 d. **C** is fastest; **B** is slowest  
 e. **B** is fastest; **A** is slowest  
**f. C** is fastest; **A** is slowest

**R(+)**



4. Which of the following reactants would give exactly the same products from both (E)- and (Z)-2-butene? (3 points)



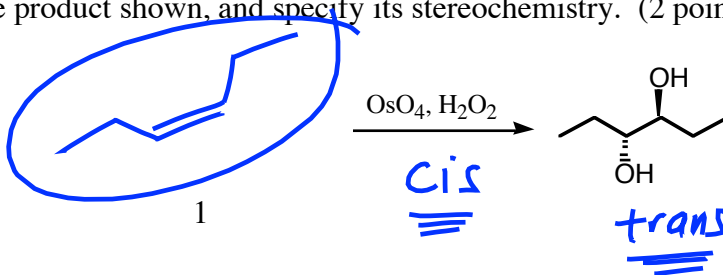
If two chiral centers are produced, then diastereomeric products are produced.

- a.  $Br_2$   
 b.  $PhCO_3H$   
**c. 1)  $BH_3$ -THF 2)  $NaOH, H_2O_2$**   
 d.  $OsO_4, H_2O_2$   
 e.  $D_2, Pt$

But if only one (or zero) chiral centers are produced, then the two alkenes don't give different products. In this case, with H-OH being added, only the carbon to which OH is added ends up being chiral, so you get the same racemic mix of 2-butanol either way.

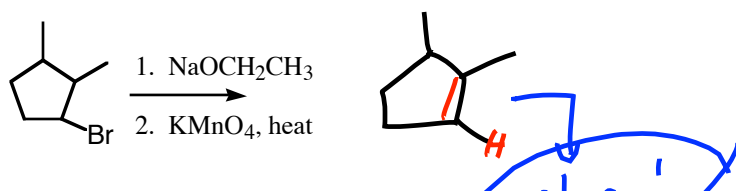
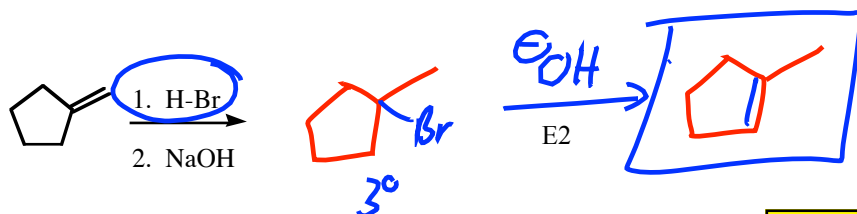
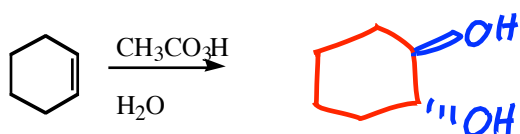
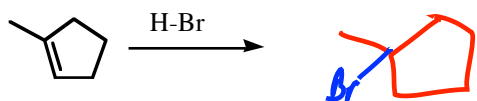
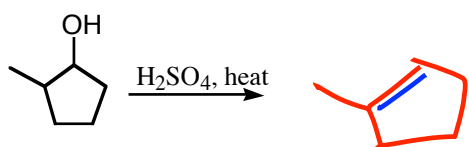
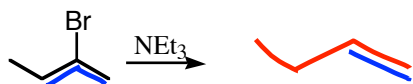
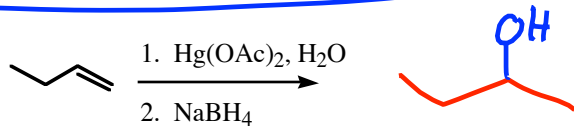
5. Draw the alkene that gives the product shown, and specify its stereochemistry. (2 points)

The normal "E" alkene would have given the wrong product stereochemistry. If the cis/trans sense of the addition and the cis/trans appearance of the product match, then "E" alkene would have worked.

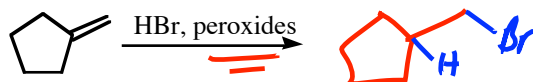
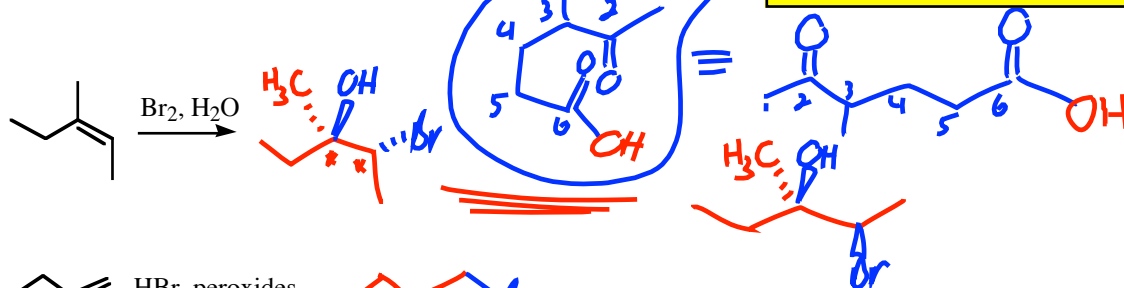


6. Draw the **major** product for each of the following reactions or reaction sequences. You needn't bother to show side products or minor products. For chiral molecules that are racemic, you needn't draw both enantiomers. **BE CAREFUL TO SHOW THE CORRECT ORIENTATION, AND THE CORRECT STEREOCHEMISTRY IN CASES WHERE STEREOCHEM IS FACTOR.** (3 points each)

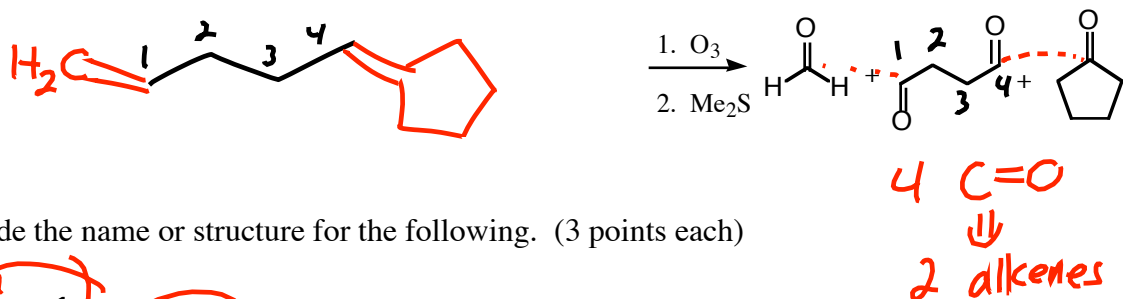
*2 chiral C's*



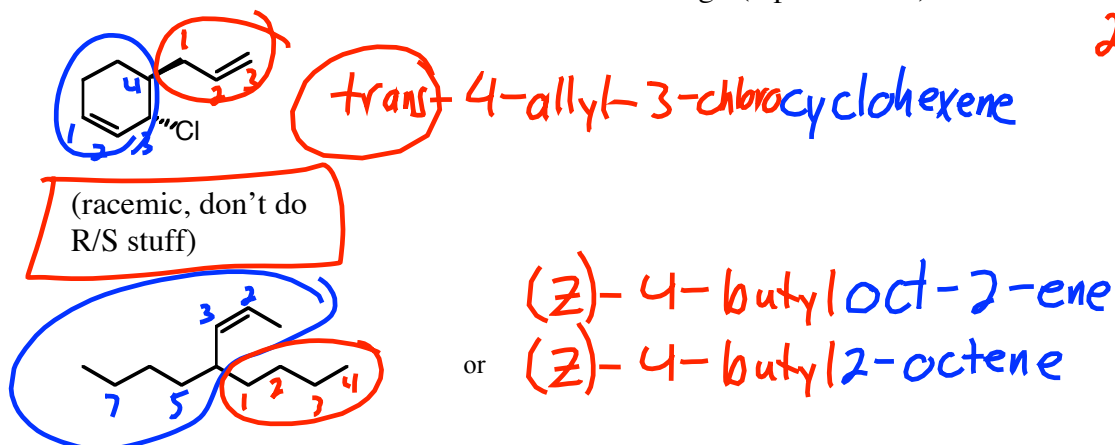
Flawed problem. Assume E2 in the first step, to produce an alkene that you can use in step two. But in reality, since the RBr is 2° and the base is normal, you'd really get more SN2 than E2 in the first step. My mistake! Also, I may have run out of class time and not required you to know the KMnO4 reaction.



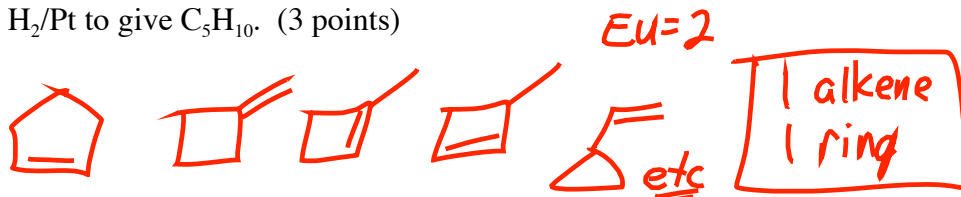
7. A single unknown reacts with  $O_3/Me_2S$  to give the following three products. What is the structure for the unknown? (3 points)



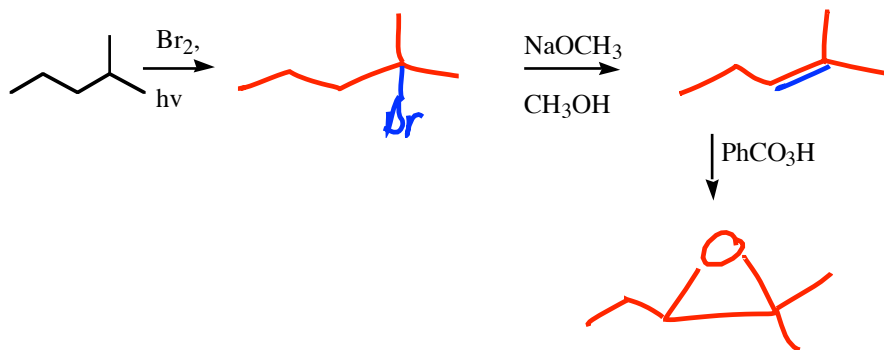
8. Provide the name or structure for the following. (3 points each)



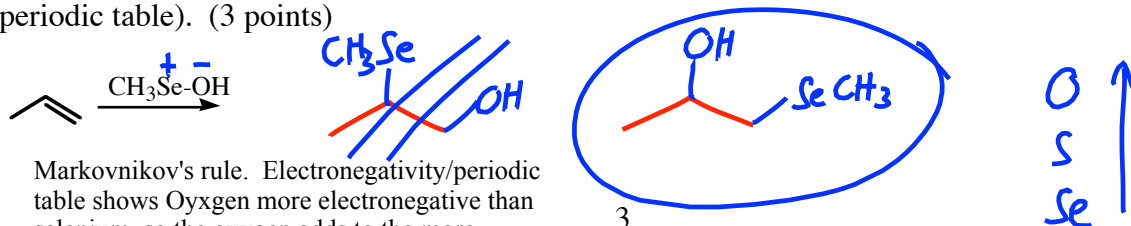
9. Provide a possible structure for a compound with formula  $C_5H_8$ , given that it reacts with excess  $H_2/Pt$  to give  $C_5H_{10}$ . (3 points)



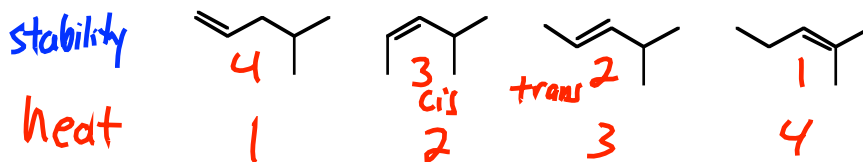
10. Fill in the blanks for the following reaction sequence: (6 points)



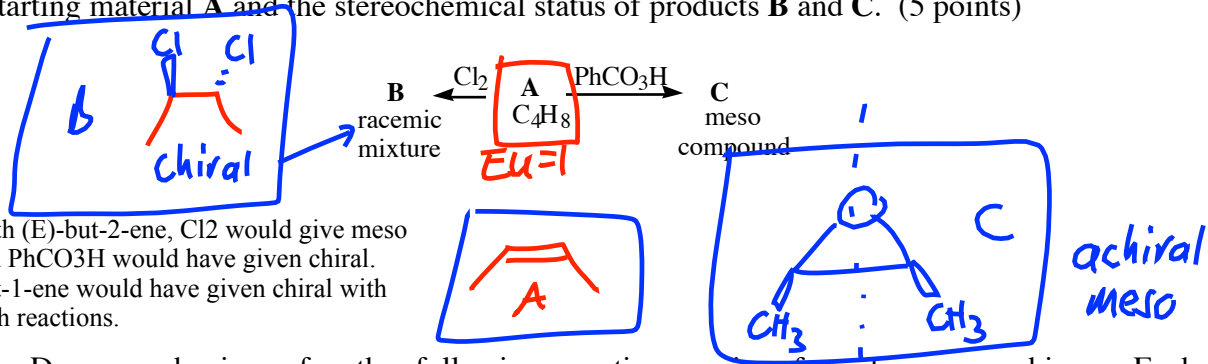
11. Consider how the Se-O bond would be polarized and predict the product which would result when  $CH_3SeOH$  adds to propene: (Selenium is located two rows directly below oxygen on the periodic table). (3 points)



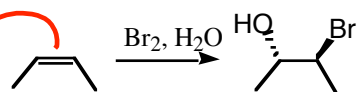
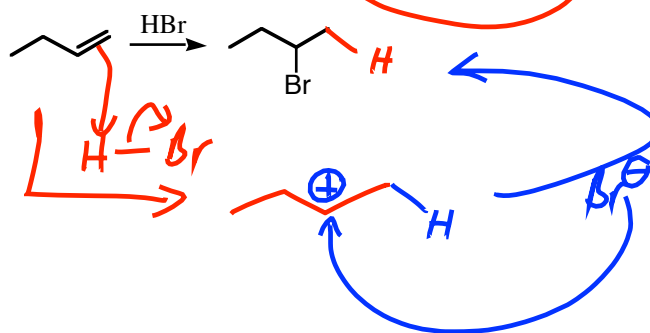
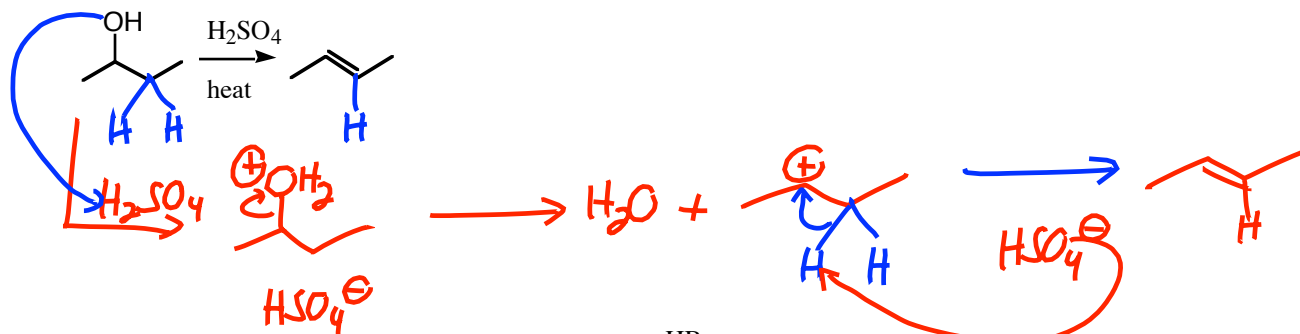
12. When the following isomeric alkenes are fully burned, rank the amount of heat produced in the combustions, from most heat produced (1) to least heat produced (4). (3 points)



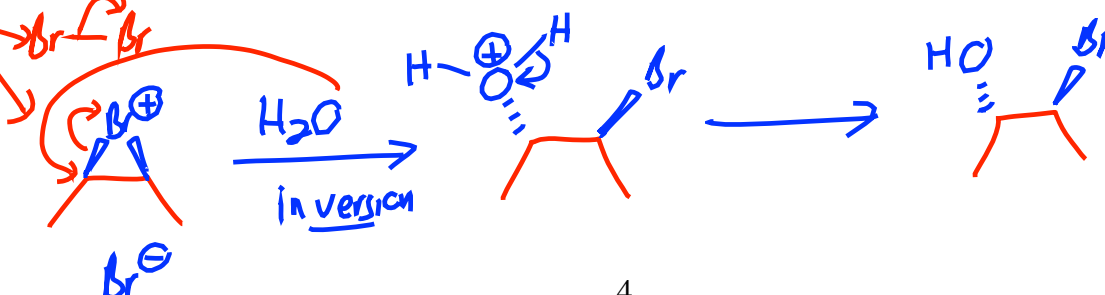
13. Provide structures for starting material **A** and reactions products **B** and **C**, given the formula of starting material **A** and the stereochemical status of products **B** and **C**. (5 points)



14. Draw mechanisms for the following reactions, using formal arrow-pushing. Each intermediate along the mechanism pathway must be shown. (6 points, 3 points, 6 points)



(be sure your mech. is consistent with the observed stereochemistry)



15. Provide reagents for the following transformations. (5 points each)

