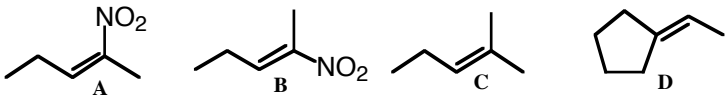
JASPERSE CHEM 350 TEST 3 VERSION 1
Ch. 7 Structure and Synthesis of Alkenes
Ch. 8 Reactions of Alkenes

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

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

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

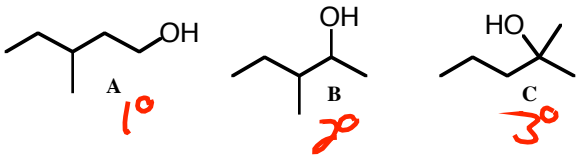
2. For the three structures shown, which of the statements is true? (3 points)



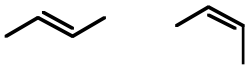
a. A, C, and D are Z; B is E
b. A and B are the only Z compounds
c. A is the only Z compound; B is the only E compound
d. B, C, and D are Z; A is E
e. B is the only Z compound; A is the only E compound

3. Rank the reactivity of the following toward H_2SO_4/Î catalyzed dehydration. (3 points)
heat

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



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



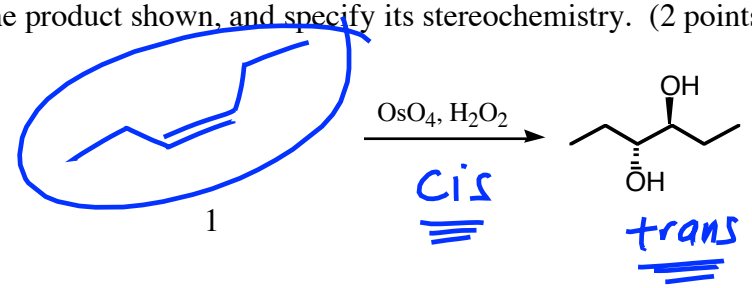
a. Br_2
b. $PhCO_3H$
c. 1) BH_3-THF 2) NaOH, H_2O_2
d. OsO_4, H_2O_2
e. D_2, Pt

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

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.

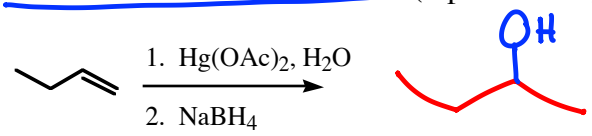
5. Draw the alkene that gives the product shown, and specify its stereochemistry. (2 points)

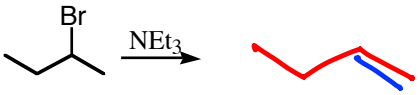
The normal "E" alkene would have given the wrong product stereochemistry. If the cis/trans sense of the addition and the cis/trans appearance of the product match, then "E" alkene would have worked.

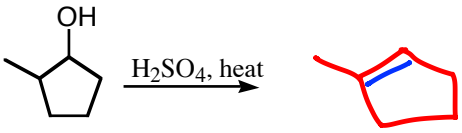


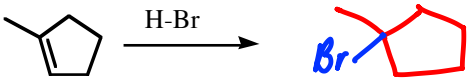
6. Draw the **major** product for each of the following reactions or reaction sequences. You needn't bother to show side products or minor products. For chiral molecules that are racemic , you needn't draw both enantiomers. BE CAREFUL TO SHOW THE CORRECT ORIENTATION, AND THE CORRECT STEREOCHEMISTRY IN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

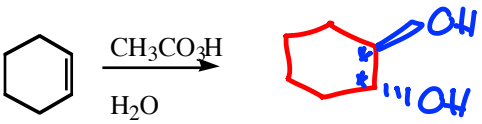
⇒ 2 chiral C's

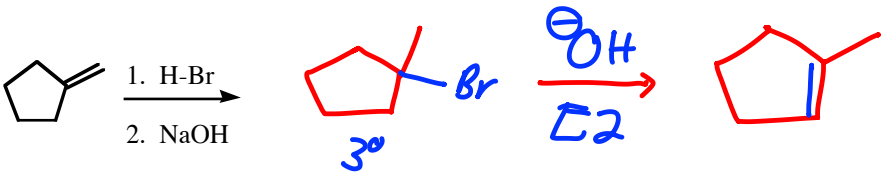


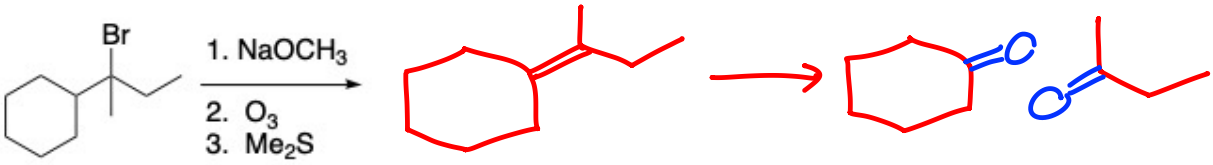


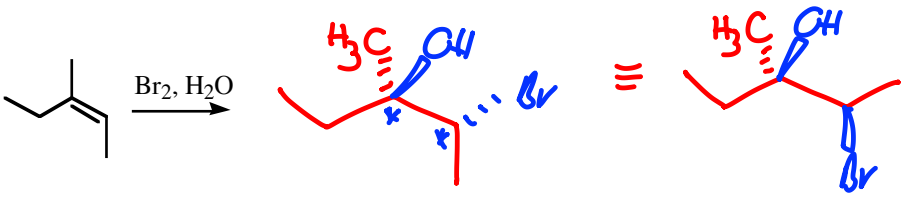


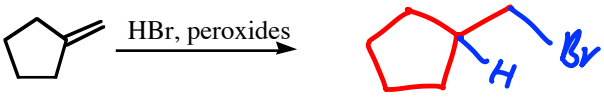








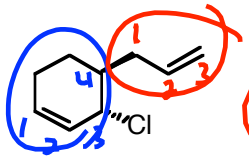




7. A single unknown reacts with O_3/Me_2S to give the following three products. What is the structure for the unknown? (3 points)

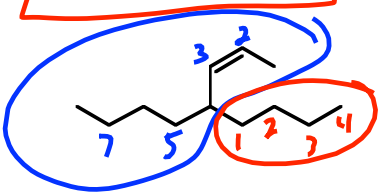
4 C=O
⇓
2 alkenes

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



trans-4-allyl-3-chlorocyclohexene

(racemic, don't do R/S stuff)

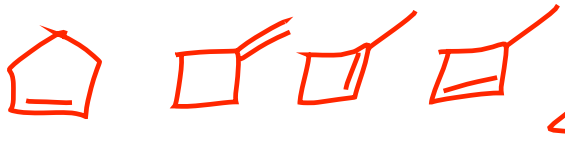


or

(Z)-4-butyloct-2-ene
(Z)-4-butyl-2-octene

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)

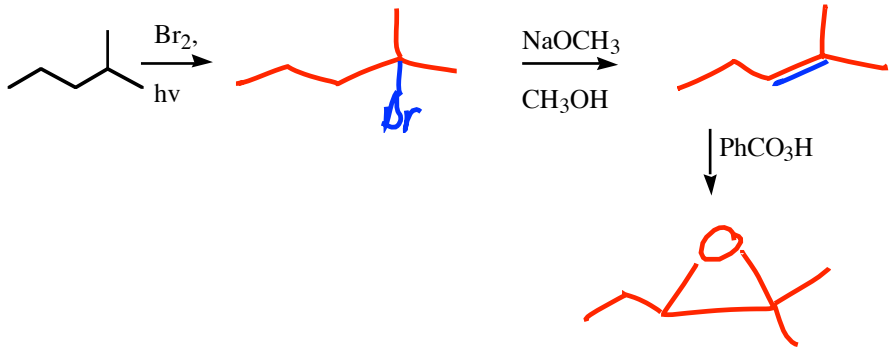
EU=2



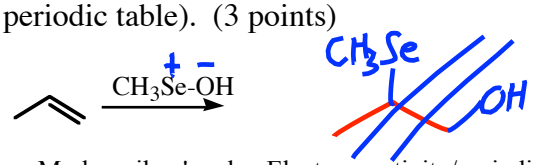
etc

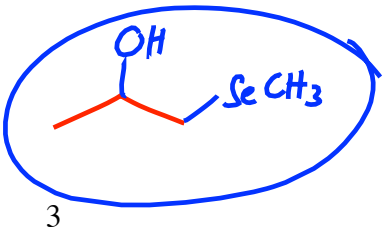
1 alkene
1 ring

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)

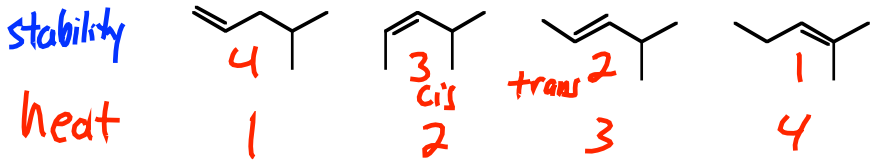




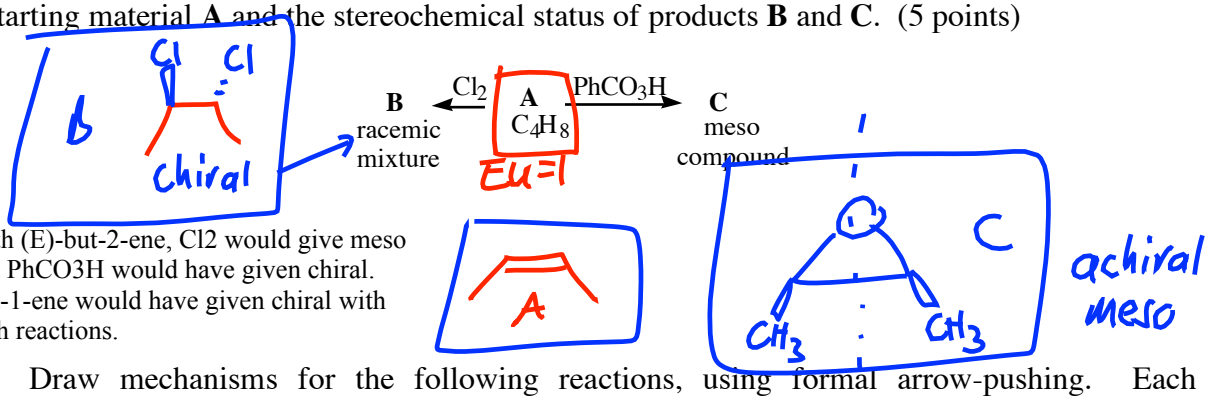
O
S
Se

Markovnikov's rule. Electronegativity/periodic table shows Oxygen more electronegative than selenium, so the oxygen adds to the more substituted end of the alkene.

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)

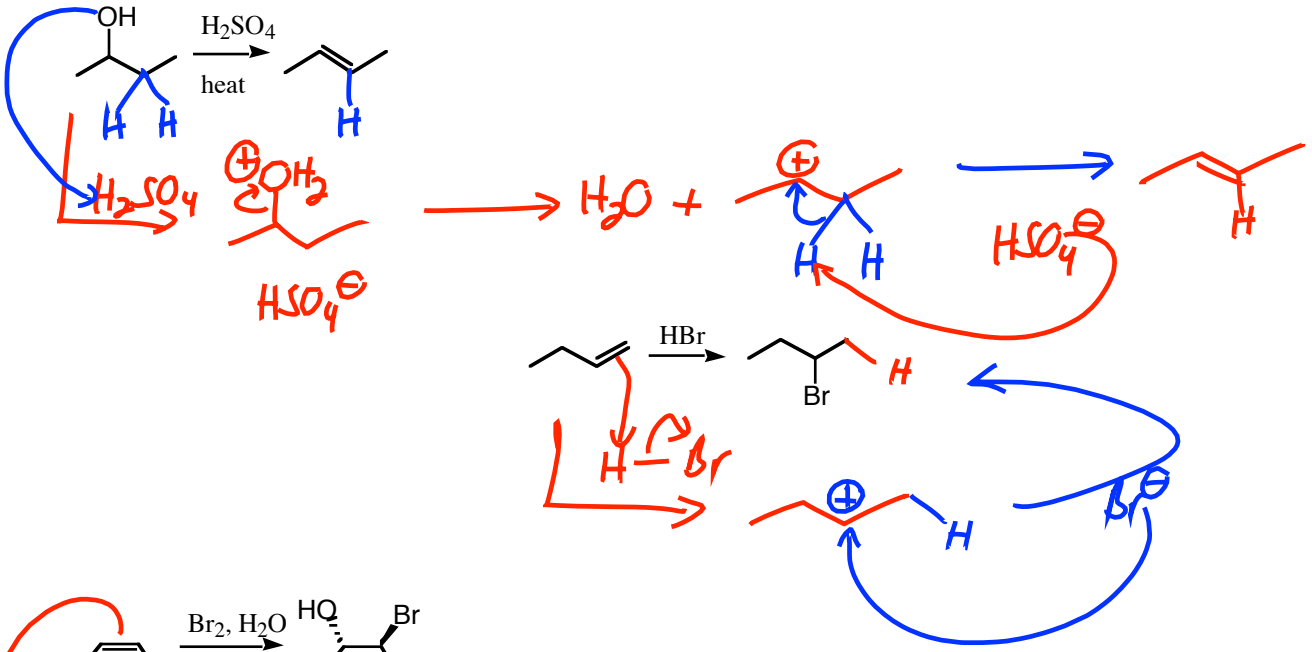


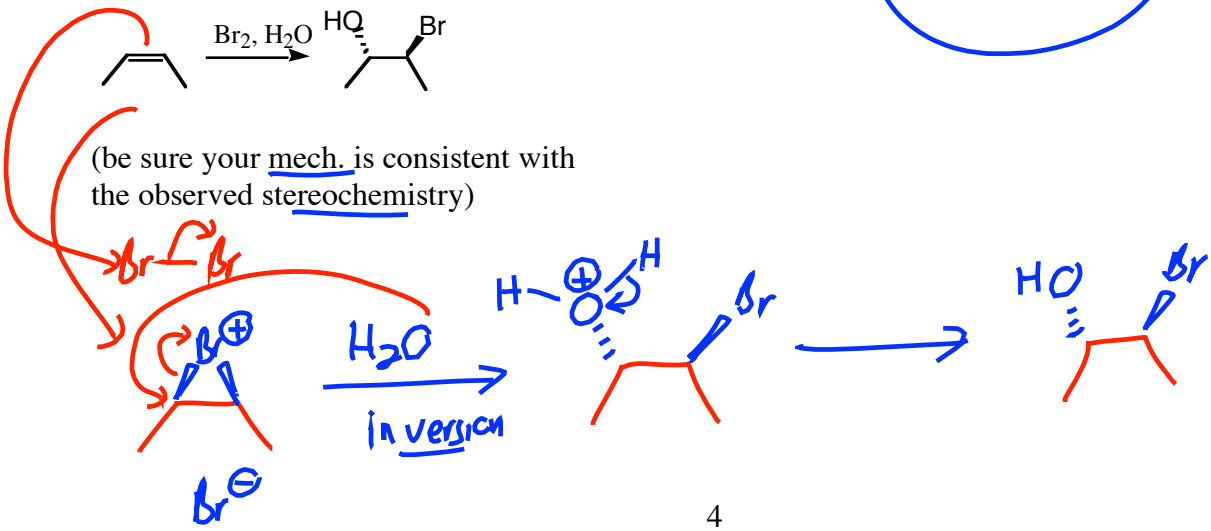
13. Provide structures for starting material **A** and reactions products **B** and **C**, given the formula of starting material **A** and the stereochemical status of products **B** and **C**. (5 points)



With (E)-but-2-ene, Cl2 would give meso and PhCO3H would have given chiral. But-1-ene would have given chiral with both reactions.

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)





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