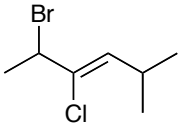
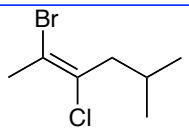
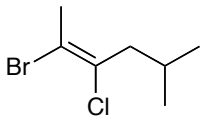
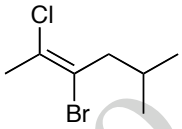
1-10. Multiple choice. Choose the *best* answer for the following questions (40 pts)

1. Which of the following is (E)-2-bromo-3-chloro-5-methyl-2-hexene?

a) 

b) 

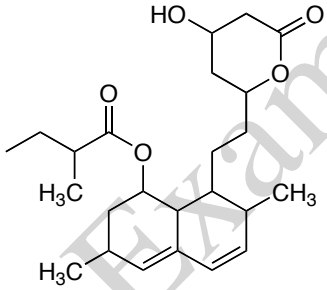
c) 

d) 

2. Which of the following alkenes is predicted to have the lowest heat of hydrogenation?

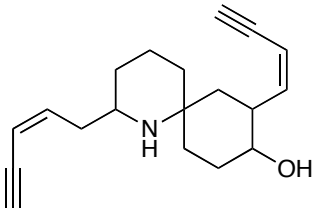
a. 1-hexene
b. 2-methyl-2-pentene
c. (*E*)-4-methyl-2-pentene
d. 2,3-dimethyl-2-butene

3. How many chiral (stereogenic) centers are in the following molecule?



a) 5 b) 6 c) 7 d) 8

4. Histrionicotoxin (below) is a potent neurotoxin isolated from a South American poison dart frog. How many stereoisomers of histrionicotoxin are possible?

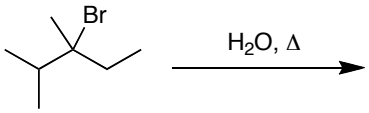


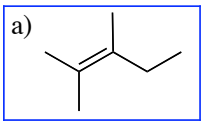
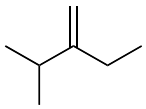
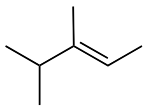
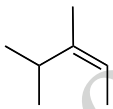
a) 4 b) 12 c) 16 d) 64

5. The specific rotation of an enantiomerically pure substance is +1.68°. The specific rotation of a sample of this substance was measured to be +0.84°. What is the enantiomeric excess (optical purity) of the sample?

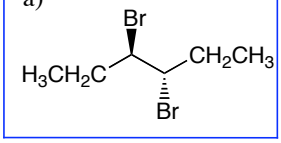
a) 84 %
b) 75%
c) 50%
d) cannot be determine with the information given.

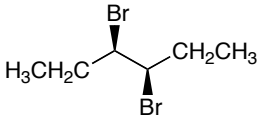
6. Which is expected to be the major elimination product of 3-bromo-2,3-dimethylpentane under the specified conditions?

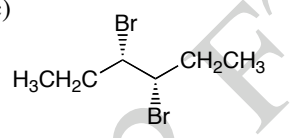


a) 
b) 
c) 
d) 

7. Which is a product of the reaction of Br_2 and (E)-3-hexene

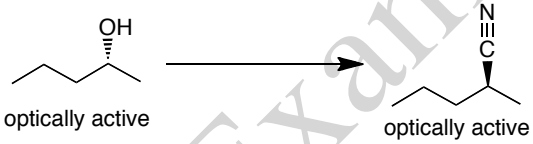
a) 

b) 

c) 

d) **b** and **c** are both products of the reaction of Br_2 and (*E*)-3-hexene

8. Which reagent or sequence of reagents is best for the following functional group transformation.



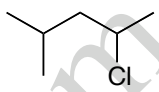
a) 1. PBr_3; 2. $^-C{\equiv}N$

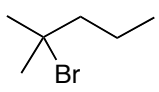
b) 1. HBr; 2. $^-C{\equiv}N$

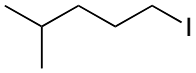
c) 1. TsCl (p-toluenesulfonyl chloride); 2. $^-C{\equiv}N$

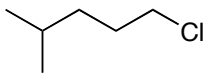
d) H-CN, heat

9. What is the order of relative reactivity of the alkyl halides (**I**-**IV**) below for the S_N2 reaction, from most reactive to least reactive?

I 

II 

III 

IV 

a. III > II > I > IV

b. III > IV > I > II

c. II > I > IV > III

d. IV > III > I > II

10. Which is the best reagent for the conversion of (*S*)-2-pentanol to (*R*)-2-chloropentane?

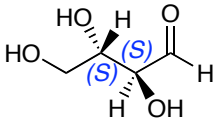
a. HCl

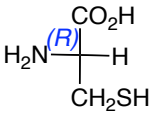
b. Cl_2, hν

c. $SOCl_2$

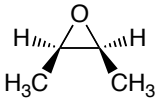
d. All of the above; a, b, and c will work equally well.

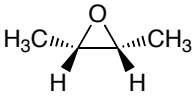
11 a. Assign the absolute configuration of all stereogenic (chiral) centers for the compounds shown below. (6 pts)



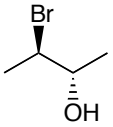


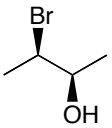
b. Identify the following pairs of compounds as either enantiomers, diastereiomers, or identical. (8 pts)



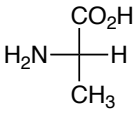


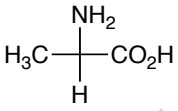
Identical (meso)



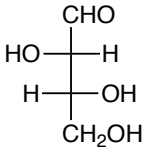


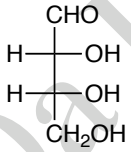
Diastereomers





Enantiomers

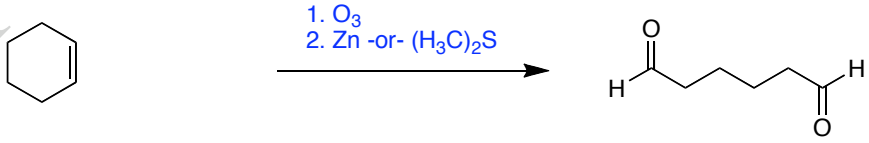




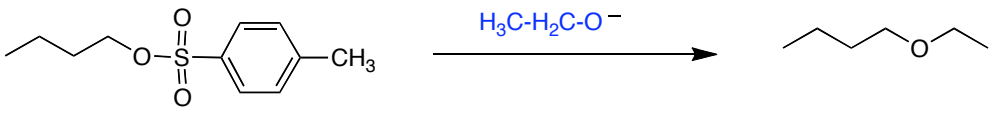
Diastereomers

12. Provide the necessary reagent(s) for the following reactions. (9 pts)

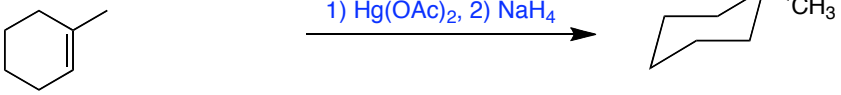
a)



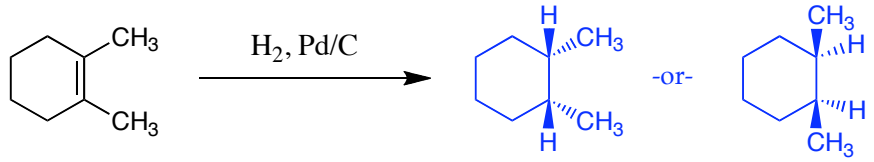
b)

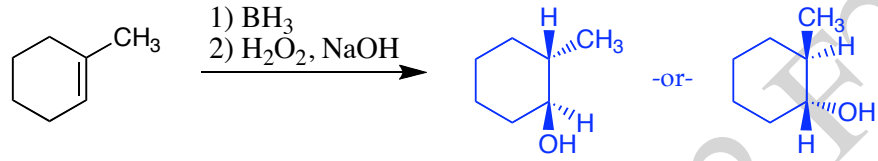


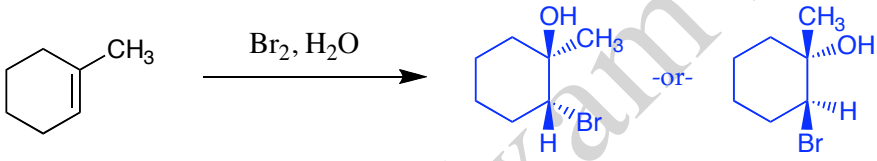
c)

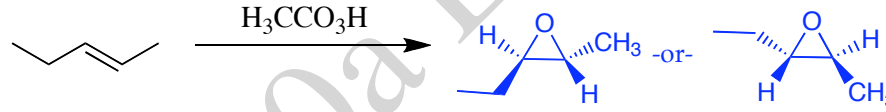


13. Give the product of each of the following reactions. *Clearly indicate the stereochemistry of each product*. (12 pts)

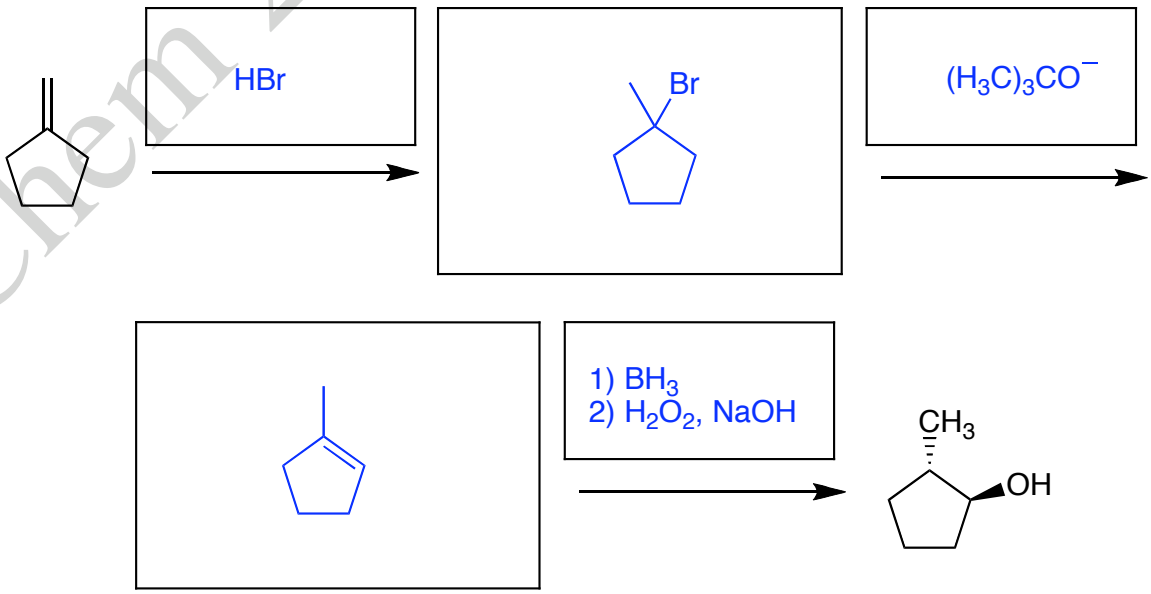
a) 

b) 

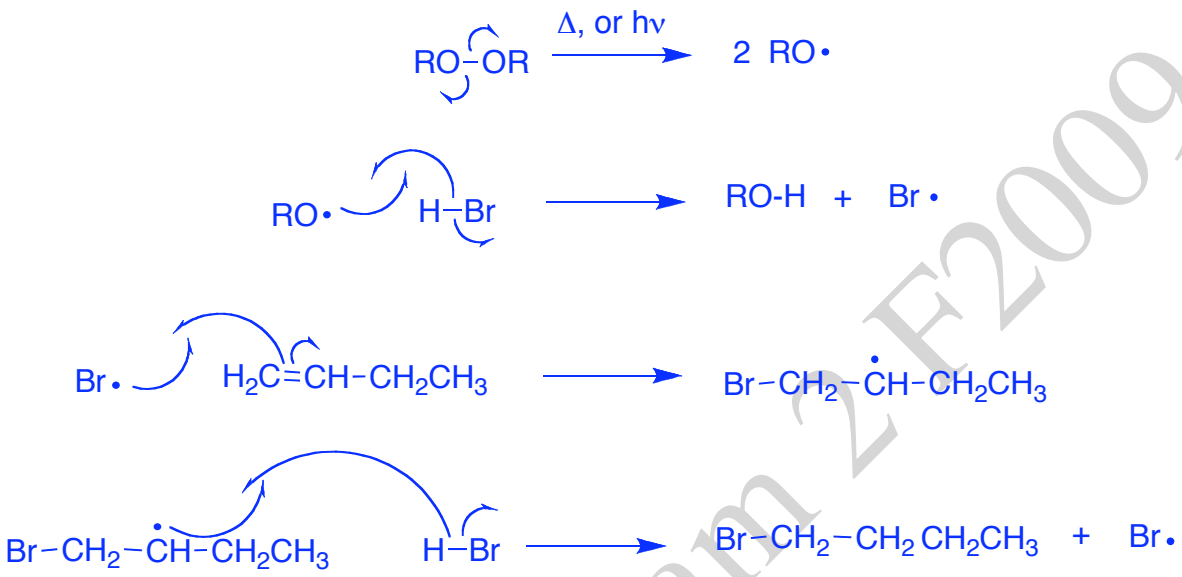
c) 

d) 

14. Fill in the reagents and intermediate products to complete the following synthesis. (12 pts)



15. Provide a complete, stepwise mechanism for the reaction of 1-butene with HBr and peroxides to afford 1-bromobutane. (13 pts)



Problem	1-10:_____	(40 pts)	13:_____	(12 pts)
	11:_____	(14 pts)	14:_____	(12 pts)
	12:_____	(9 pts)	15:_____	(13 pts)

Total out of 100: _____