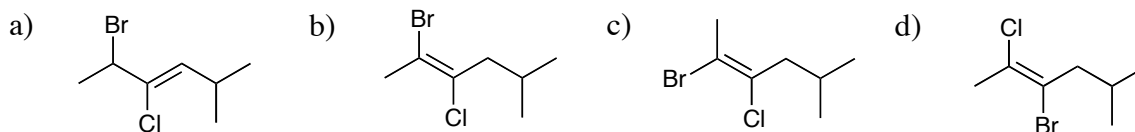


1-10. Multiple choice. Choose the *best* answer for the following questions (40 pts)

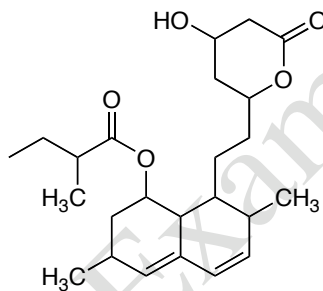
1. Which of the following is (E)-2-bromo-3-chloro-5-methyl-2-hexene?



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

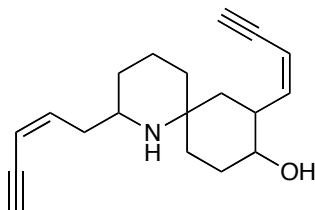
- 1-hexene
- 2-methyl-2-pentene
- (E)-4-methyl-2-pentene
- 2,3-dimethyl-2-butene

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



- 5
- 6
- 7
- 8

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

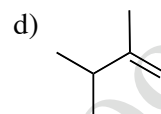
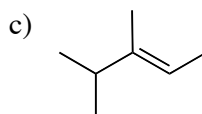
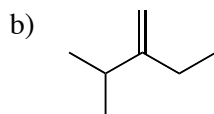
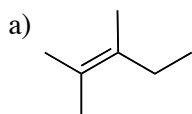
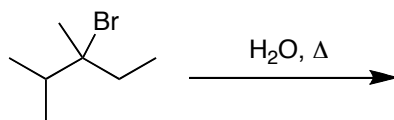


- 4
- 12
- 16
- 64

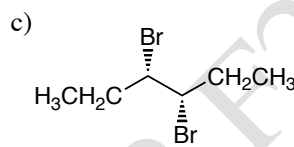
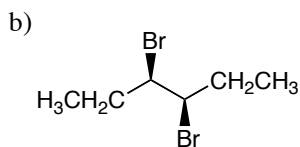
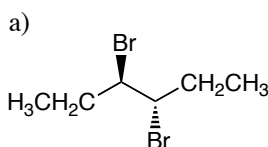
5. The specific rotation of an enantiomerically pure substance is  $+1.68^\circ$ . The specific rotation of a sample of this substance was measured to be  $+0.84^\circ$ . What is the enantiomeric excess (optical purity) of the sample?

- 84 %
- 75%
- 50%
- 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?

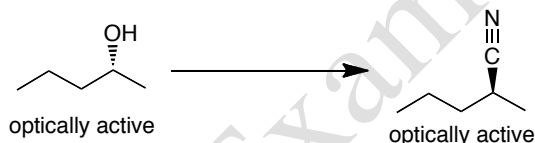


7. Which is a product of the reaction of  $\text{Br}_2$  and (*E*)-3-hexene

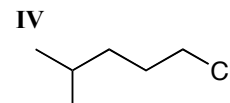
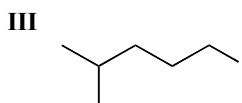
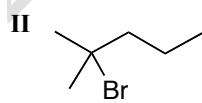
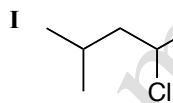


d) **b and c** are both products of the reaction of  $\text{Br}_2$  and (*E*)-3-hexene

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

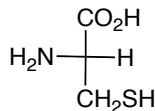
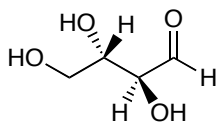


- a) 1.  $\text{PBr}_3$ ; 2.  $^- \text{C}\equiv\text{N}$   
 b) 1.  $\text{HBr}$ ; 2.  $^- \text{C}\equiv\text{N}$   
 c) 1.  $\text{TsCl}$  (p-toluenesulfonyl chloride); 2.  $^- \text{C}\equiv\text{N}$   
 d)  $\text{H-CN}$ , heat
9. What is the order of relative reactivity of the alkyl halides (I-IV) below for the  $\text{S}_{\text{N}}2$  reaction, from most reactive to least reactive?

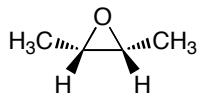


- a. III > II > I > IV  
 b. III > IV > I > II  
 c. II > I > IV > III  
 d. IV > III > I > II
10. Which is the best reagent for the conversion of (*S*)-2-pentanol to (*R*)-2-chloropentane?
- a.  $\text{HCl}$   
 b.  $\text{Cl}_2$ ,  $h\nu$   
 c.  $\text{SOCl}_2$   
 d. All of the above; a, b, and c will work equally well.

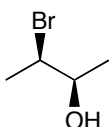
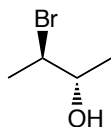
- 11 a. Assign the absolute configuration (stereochemistry) of all stereogenic (chiral) centers for the compounds shown below. (6 pts)



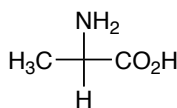
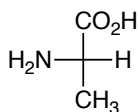
- b. Identify the following pairs of compounds as either enantiomers, diastereomers, or identical. (8 pts)



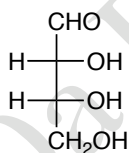
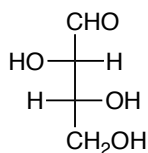
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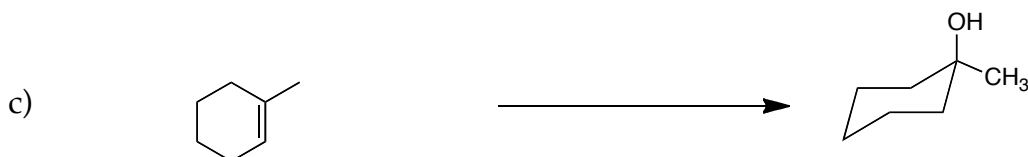
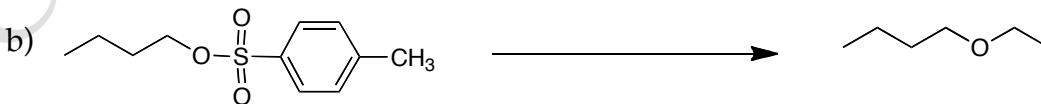


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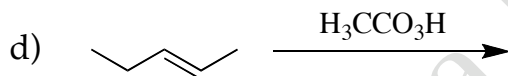
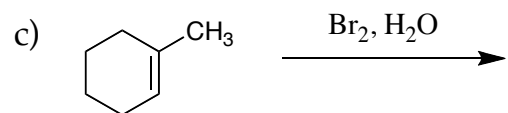
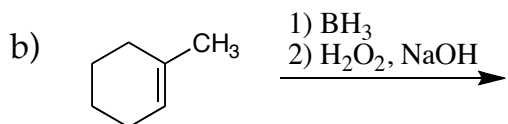
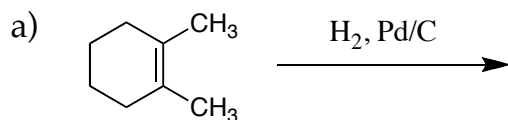


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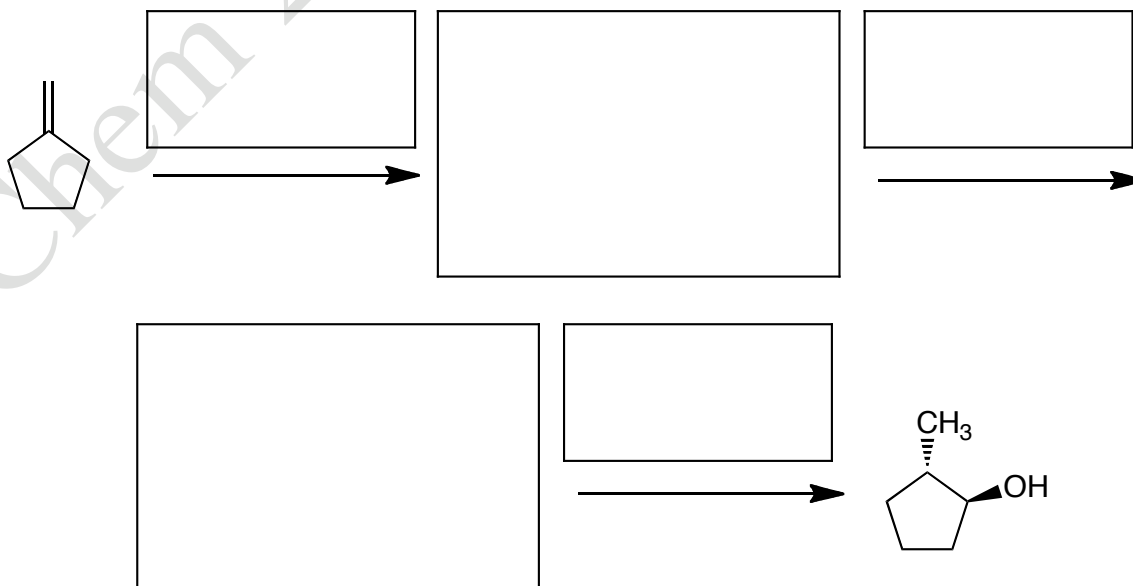
12. Provide the necessary reagent(s) for the following reactions. (9 pts)



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



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)

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

Total out of 100: \_\_\_\_\_