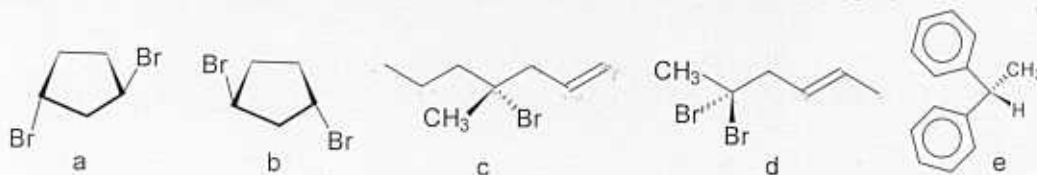


1. Suggest full, valid names for the compounds below using R,S nomenclature where appropriate. Caution, don't assign R, S to achiral compounds! (10 pts).



- A (R,R) - 1,3-dibromocyclopentane  
 B (S,S) - 1,3-dibromocyclopentane  
 C (R) - 4-bromo-4-methyl-1-heptene  
 D (E) - 5,5-dibromo-2-hexene (or: trans)  
 E 1,1-diphenylethane

2. (S)-2-butanol shows a specific angle of rotation of  $+13.52^\circ$ .

a. What angle of rotation do you measure for a solution of 2 grams of this compound in 10 mL methanol, placed in a 2 cm long cell? (4 pts)

$$\alpha = 13.52 \times 0.2 \times 0.2 = 0.54^\circ$$

b. What is the specific angle of rotation of (R)-2-butanol? (2 pts)

$$-13.52^\circ$$

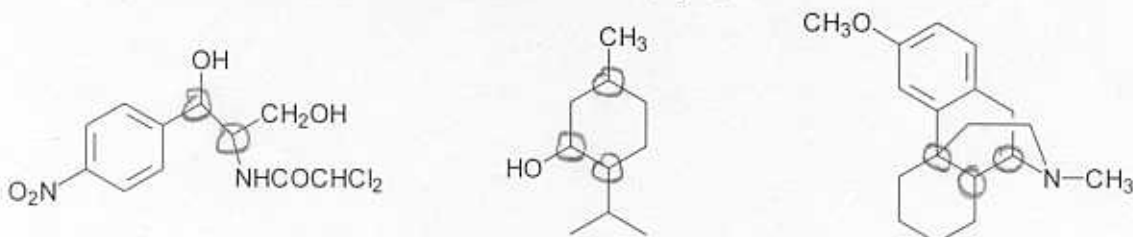
c. What angle of rotation do you measure for a solution of 2 grams of a mixture of 50% of the R enantiomer and 50% of the S enantiomer in 10 mL methanol, placed in a 2 cm long cell? (2 pts)

$$0^\circ$$

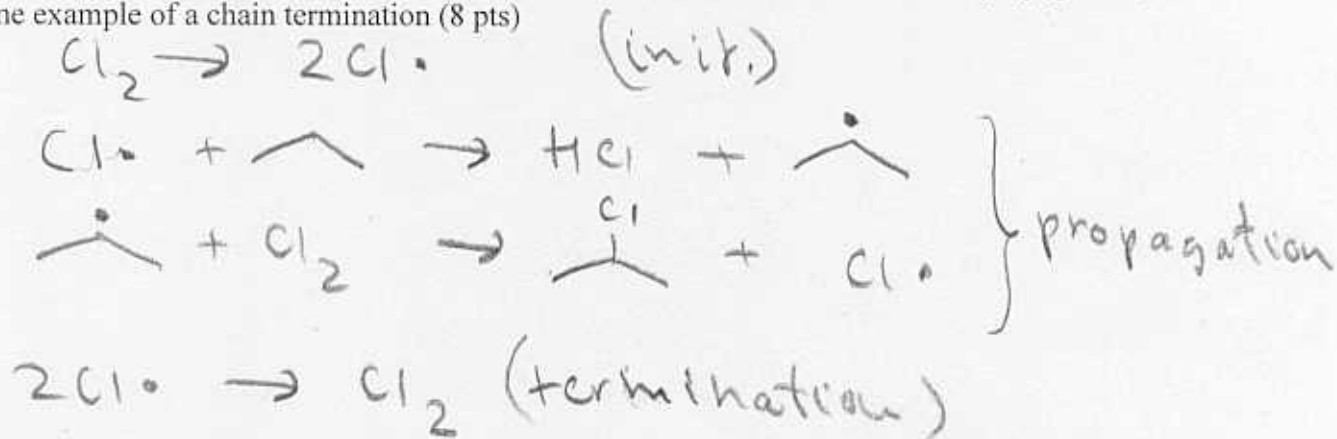
d. What angle of rotation do you measure for a solution of 1 gram the R enantiomer and 3 grams of the S enantiomer in 10 mL methanol, placed in a 2 cm long cell? (4 pts)

Same as a!

3. Circle all chiral centers in the molecules below! (8 pts)

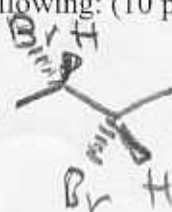


4. Show a mechanism and the main product(s) for the light-initiated radical chain chlorination of propane to chloropropane. Clearly show the steps of chain initiation, chain propagation, and one example of a chain termination (8 pts)



5. Draw reasonable representations of the following: (10 pts, 2 pts each)

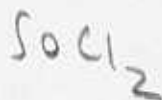
a. (2S, 3S)-2,3-dibromobutane



b. meso-1,2-dibromocyclohexane



c. thionyl chloride (show condensed or sum formula)



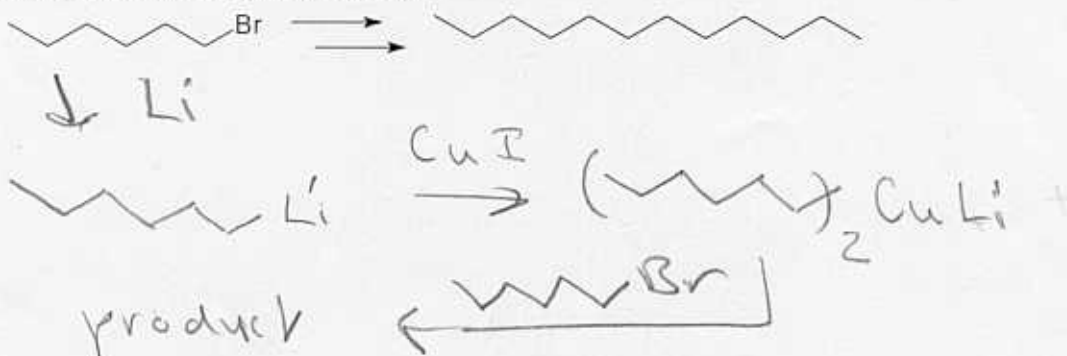
d. (1R, 2S)-1,2-dibromocyclohexane

same as b!

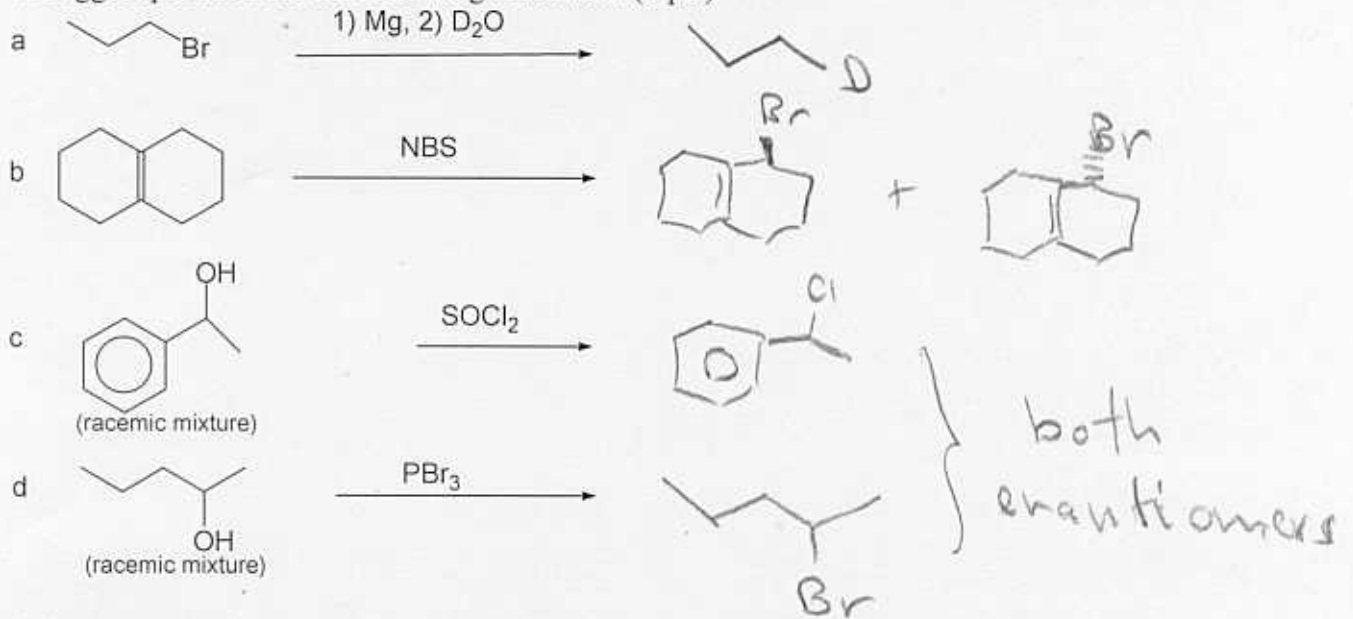
e. sodium amide (show condensed or sum formula)



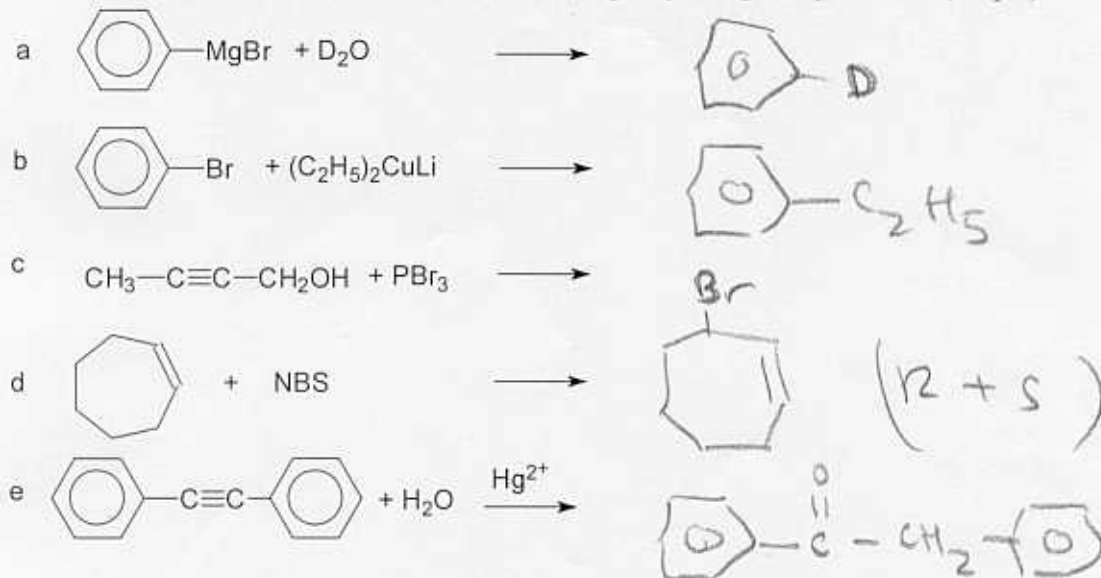
6. Suggest conditions/reagents for the following multistep conversion! You may use any inorganic reagents you need. (8 pts)



7. Suggest products for the following reactions! (8 pts)

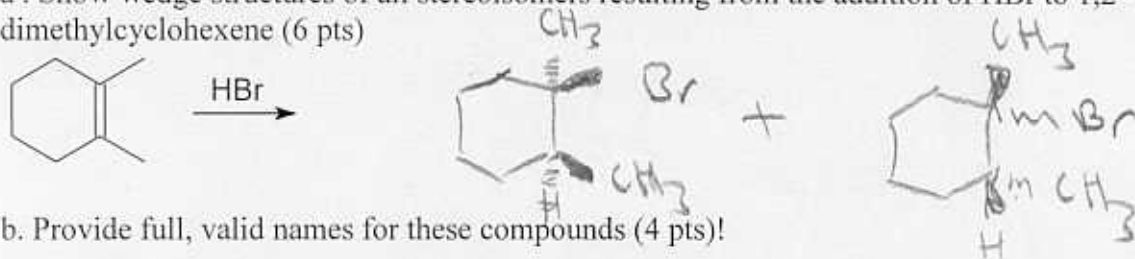


8. Complete the following reactions by showing major organic products! (10 pts)



9. Let's re-investigate an electrophilic addition reaction, complete with the stereochemistry.

a. Show wedge structures of all stereoisomers resulting from the addition of HBr to 1,2-dimethylcyclohexene (6 pts)

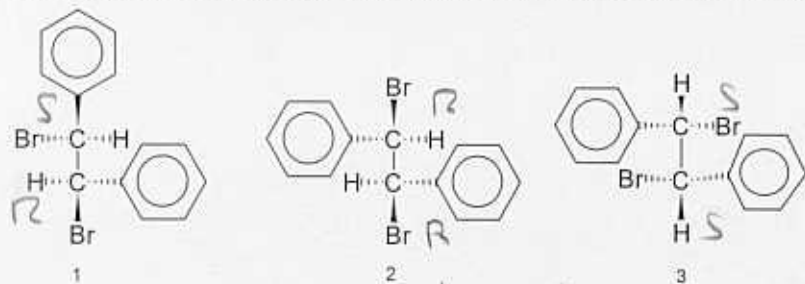


b. Provide full, valid names for these compounds (4 pts)!

(1R, 2S) - 1-bromo-1,2-dimethyl-cyclohexane

(1S, 2R) - 1-bromo-1,2-dimethyl-cyclohexane

10. Consider the three wedge representations shown below and consider their relationships. Each two could be identical, constitutional isomers, enantiomers or diastereomers.



a. What are 1 and 2? (4 pts) diastereomers

b. What are 2 and 3? (4 pts) enantiomers

11. Classify the following reactions as oxidations or reductions of the organic reactants, or N/A if they are neither (8 pts)

