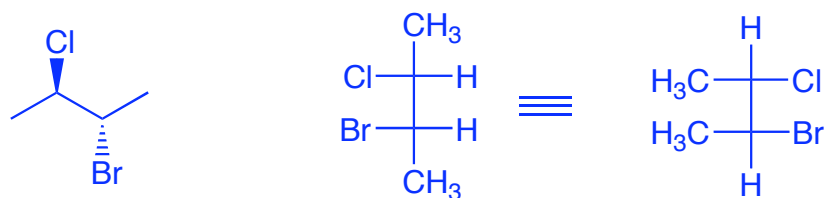
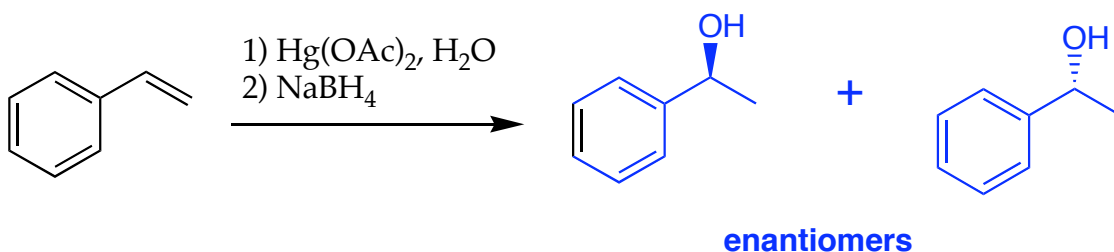
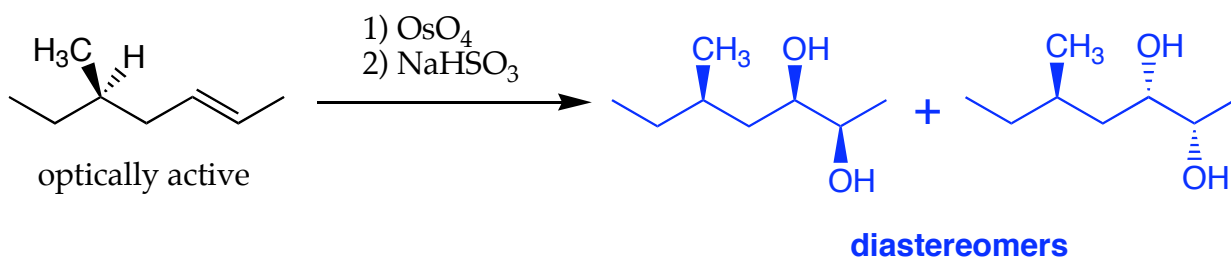


1. Draw a line structure of (2R,3S)-2-chloro-3-bromobutane. Draw a Fisher projection of the same molecule. (4 pts)



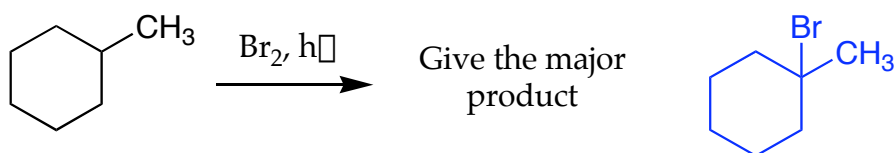
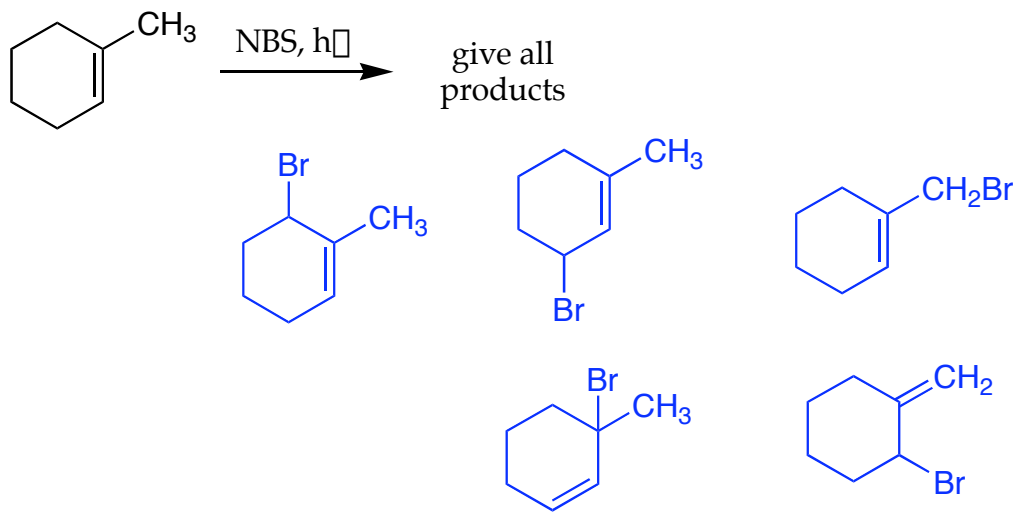
2. Draw all possible stereoisomeric products for the following reactions. What is the stereochemical relationship of the products? (8 pts)



3. 0.100 Grams of an optically active substance with a molecular weight of 500 was dissolved in 10 mL of methanol. The optical rotation of the sample was measured at 589 nm (the D-line of a sodium lamp) and 25 °C through a 1 dm pathlength and determined to be - 0.50. Calculate the specific rotation of the substance. Give the proper symbol for the specific rotation under these conditions. (5 pts)

$$[\alpha]_D^{25} = \frac{[\alpha]}{c \cdot l} = \frac{-0.50}{(0.100/10) \cdot (1)} = -50$$

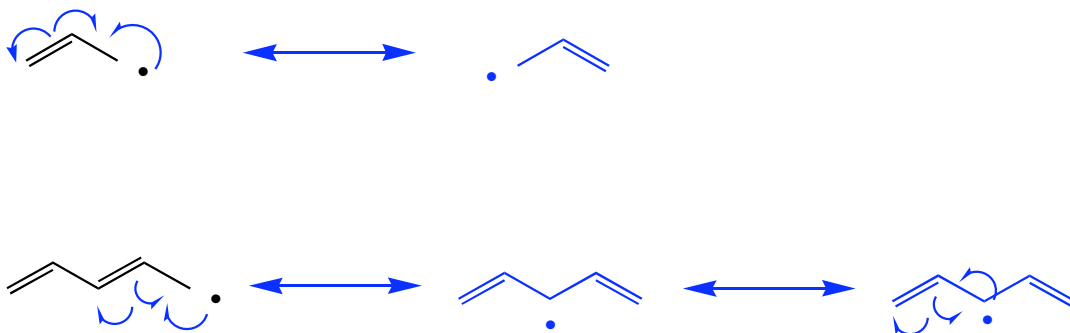
4. Give the product(s) for the following reaction. (8 pts)



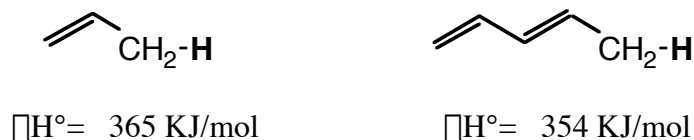
Problem 1: _____ (4 pts)
 2: _____ (8 pts)
 3: _____ (5 pts)
 4: _____ (8 pts)

Total out of 25: _____

1. Provide all possible resonance structures for the allyl and pentadienyl radicals shown below. Use curved arrows to show the interconversion of the resonance structures (9 pts).

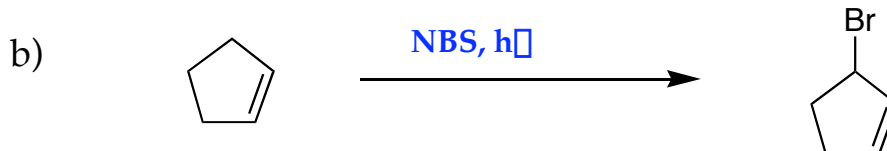
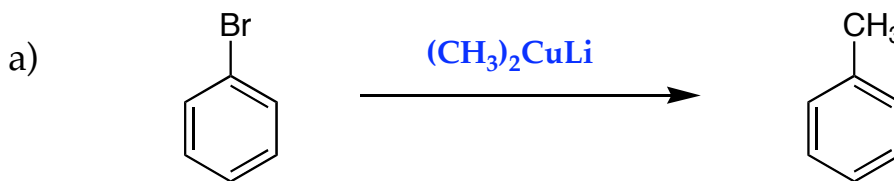


2. The bond dissociation energies of the indicated primary C-H bonds of propene and 1,3-pentadiene are given below. Briefly explain why the ΔH° for the 1,3-pentadiene C-H bond is less than that for propene. (4 pts)

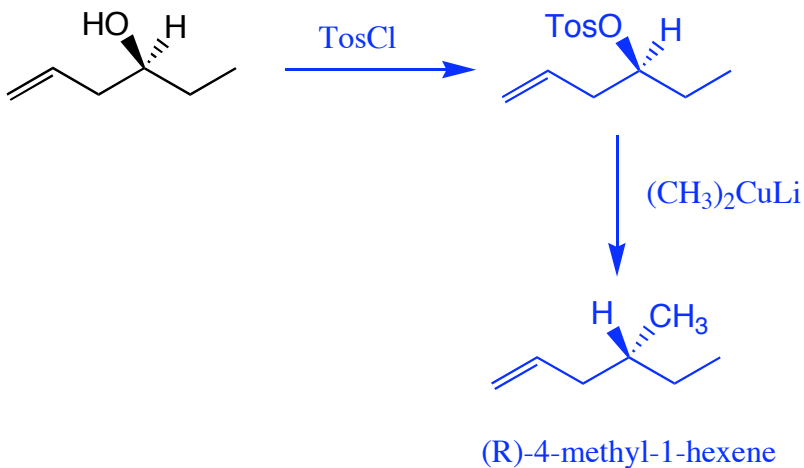


Homolytic bond dissociation gives the allyl radical and the pentadienyl radical (see problem above). The pentadienyl radical has more resonance structures and is therefore more stable than the allyl radical. The ΔH° is a reflection of the stability of the resulting radical that results from homolytic dissociation of the bond.

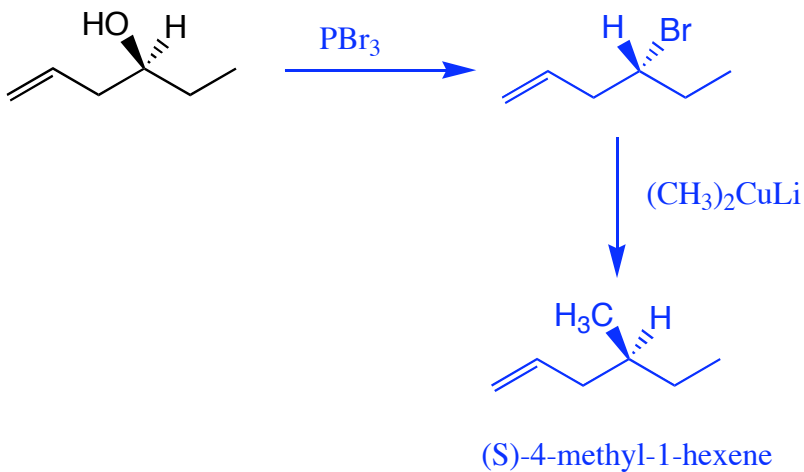
3. Provide the reagents for the following transformations. (4 pts)



4. a) Starting with the optically active alcohol shown below and any necessary reagents, devise the best possible synthesis of (R)-4-methyl-1-hexene. (4 pts)



b) Starting with the optically active alcohol shown below and any necessary reagents, devise the best possible synthesis of (S)-4-methyl-1-hexene. (4 pts)



Problem 1: _____ (9 pts) 2: _____ (4 pts)

3: _____ (4 pts) 4: _____ (8 pts)

Total out of 25: _____