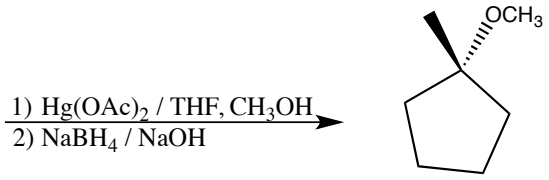
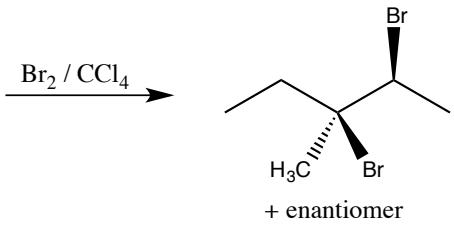
Practice Problems on Stereochemistry with Addition Reactions to Alkenes

1. In each of the following reactions with alkenes the starting reagent(s) is(are) missing. Draw all the structures that will produce the desired product in a high yield.

a)

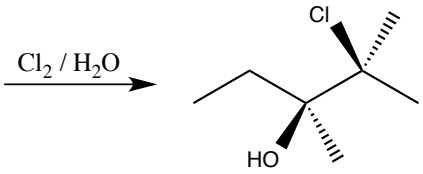


b)



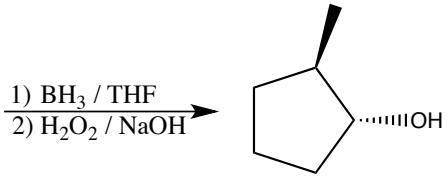
+ enantiomer

c)



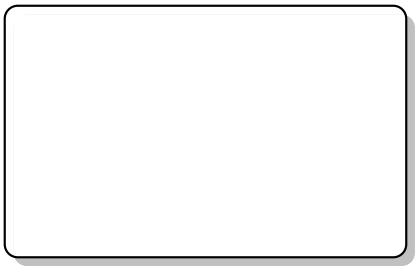
+ enantiomer

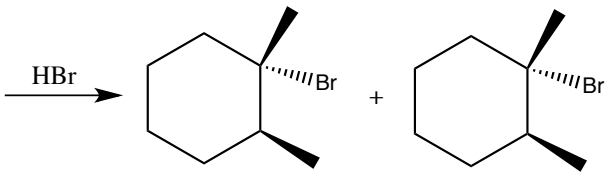
d)



+ enantiomer

e)

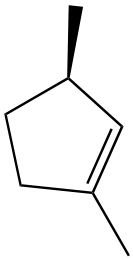




+ enantiomer + enantiomer

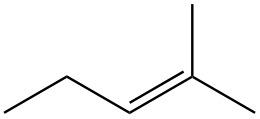
2. Draw the structure of the expected major product from each of the following reactions. If the major product is a mixture of enantiomers draw one product and write **+ enantiomer**. If the product is a mixture of diastereomers in approximately the same amount draw all of them.

a)



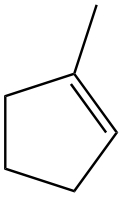
H_2 / Pd (C)

b)



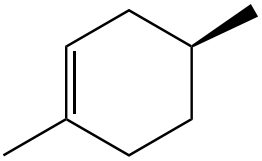
1) BD_3 / THF
2) H_2O_2 / NaOH

c)



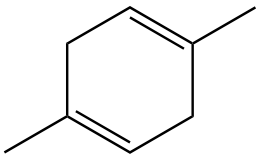
HBr / H-O-O-H

d)



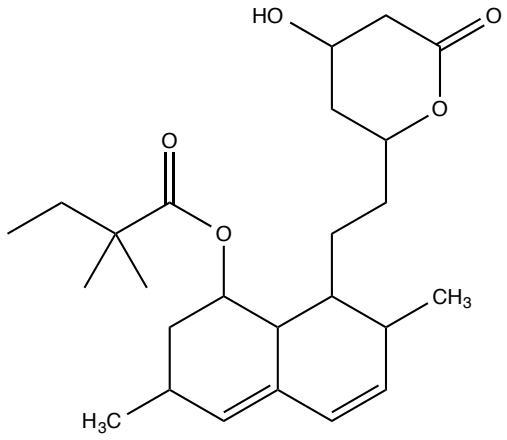
1) $Hg(OAc)_2$ / THF, H_2O
2) $NaBH_4$ / NaOH

e)



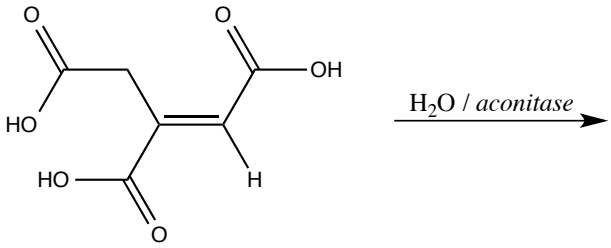
HBr (excess)

3. Circle all the stereogenic centers in simvastatin (a cholesterol lowering drug).



simvastatin

4. The enzyme *aconitase*, present in the Krebs cycle, can add water across the double bond of aconitic acid (shown below) producing 2 compounds. One of the compounds isocitric acid is optically active the other, citric acid is optically inactive. Draw the structure of each citric acid and isocitric acid in their respective boxes. Briefly explain your choices.



aconitic acid

citric acid

isocitric acid

5. An unknown alkene with molecular formula C_8H_{16} is submitted for analysis to determine its structure. Ozonolysis under reducing conditions produce a ketone (shown below) as the only product. Hydrogenation of the unknown alkene with platinum affords a *meso* alkane. Determine the structure of the unknown alkene.