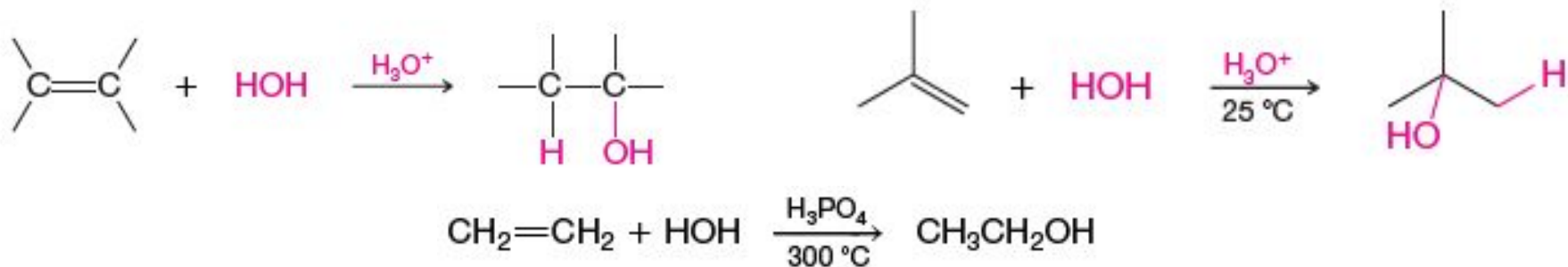


# АЛКЕНЫ (часть 2)

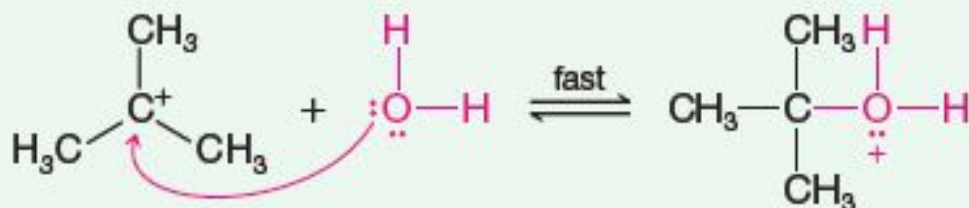


Step 1



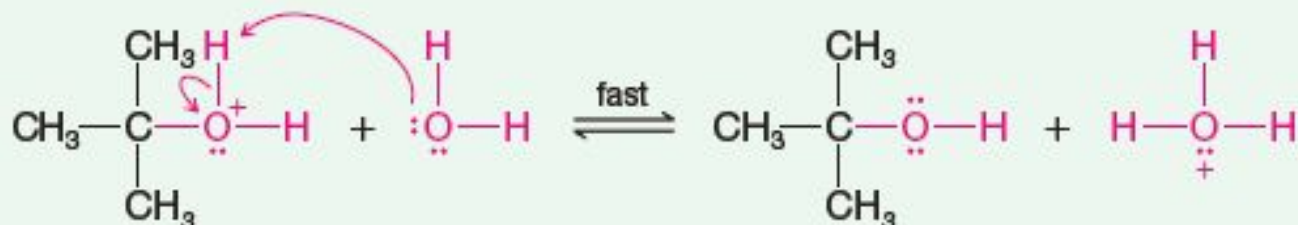
The alkene donates an electron pair to a proton to form the more stable 3° carbocation.

Step 2

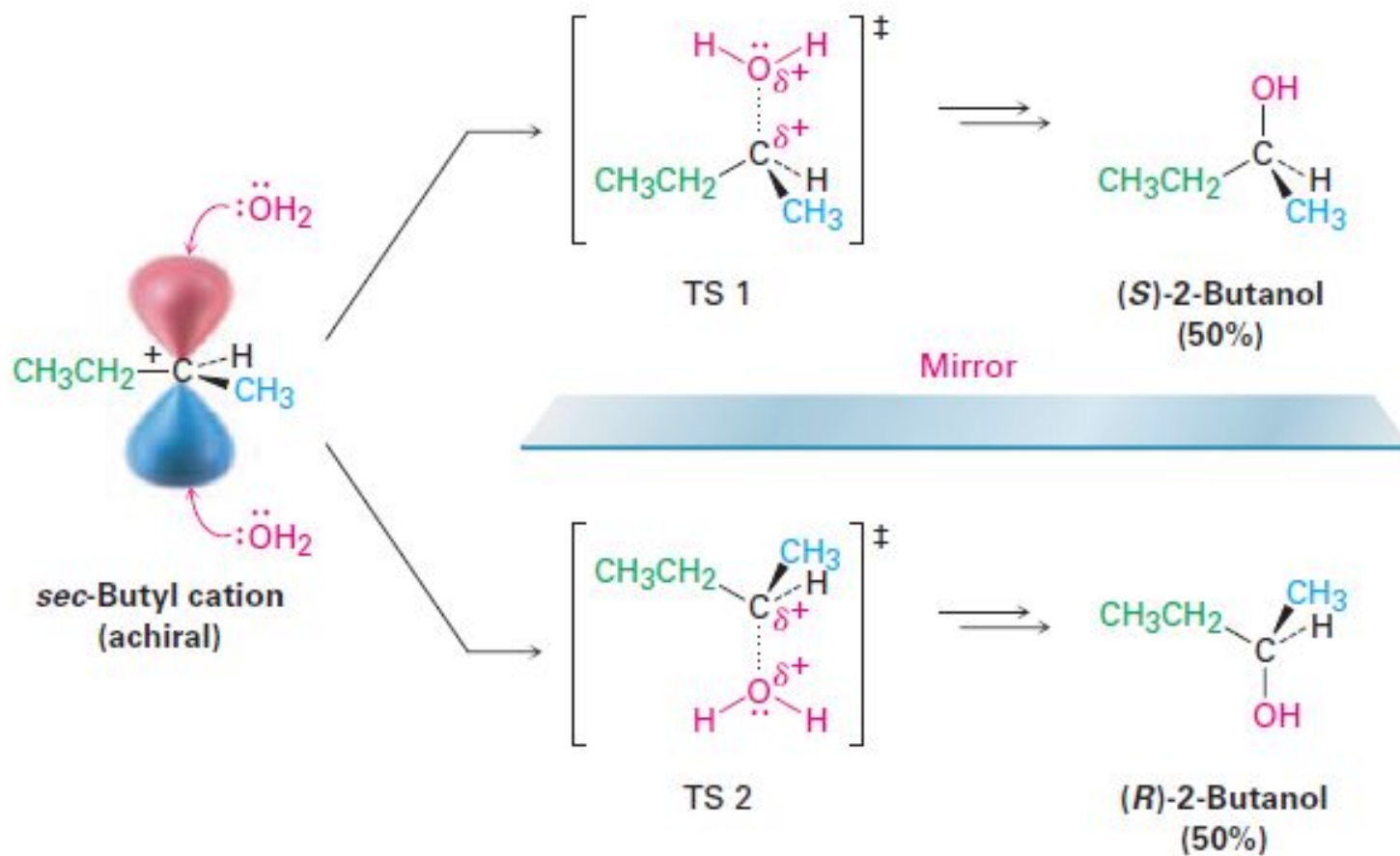
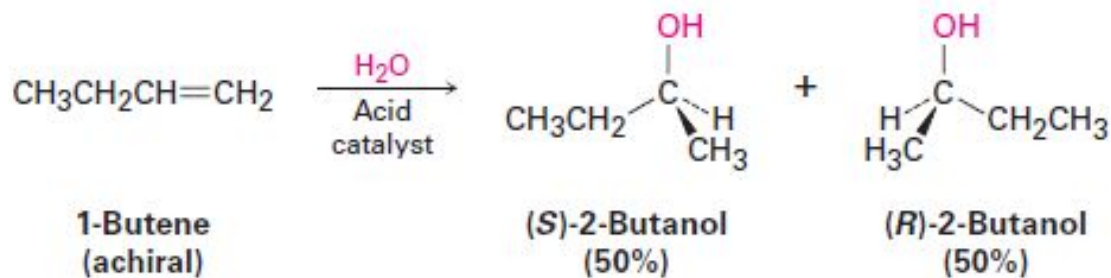


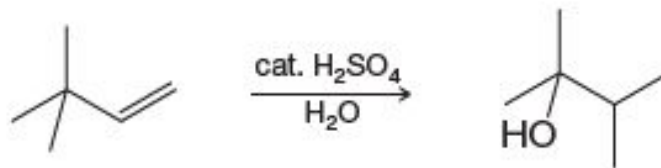
The carbocation reacts with a molecule of water to form a protonated alcohol.

Step 3



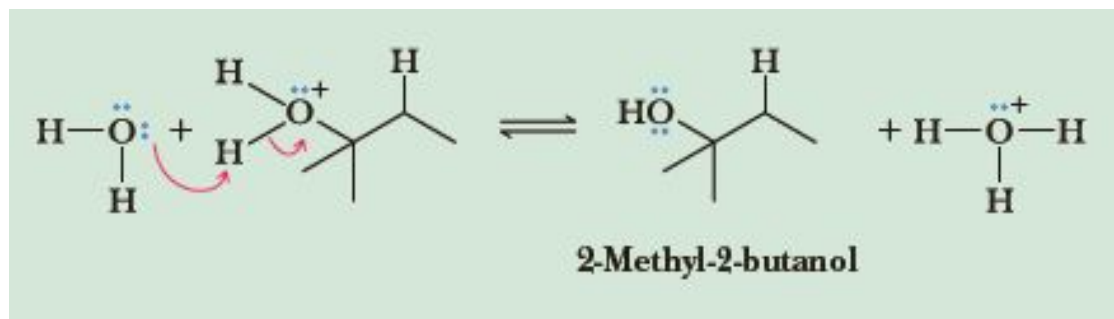
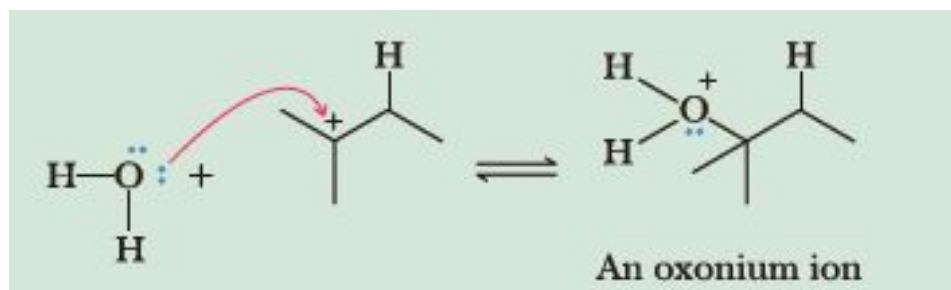
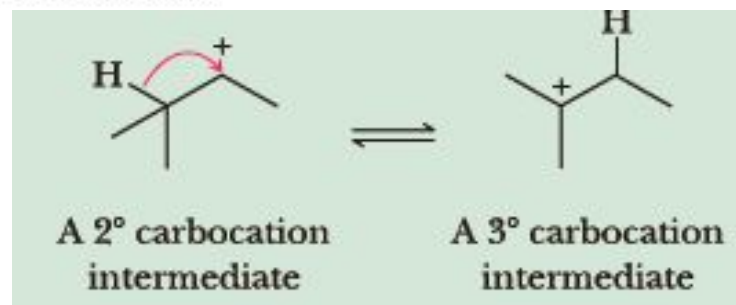
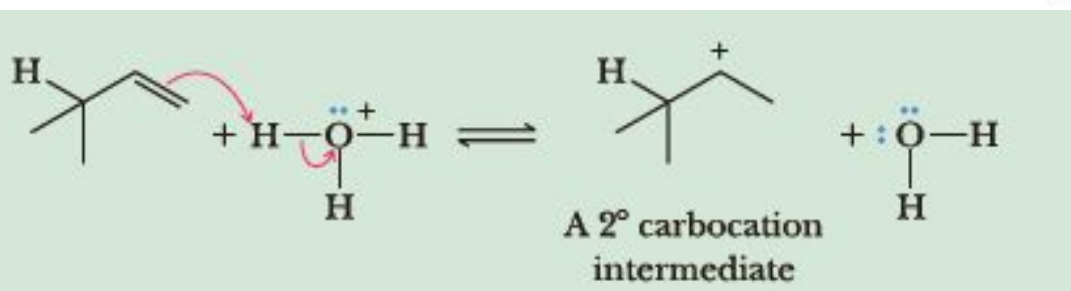
A transfer of a proton to a molecule of water leads to the product.



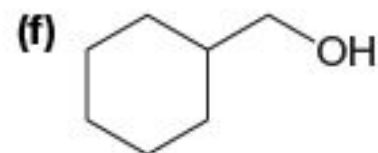
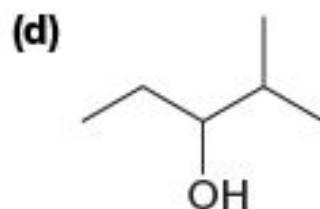
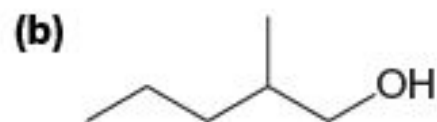
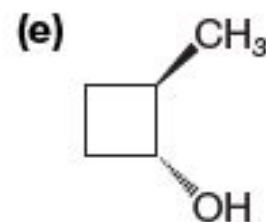
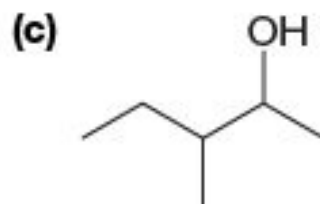


3,3-Dimethyl-1-butene

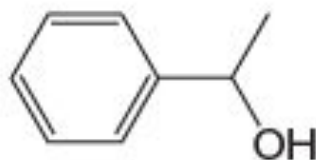
2,3-Dimethyl-2-butanol  
(major product)



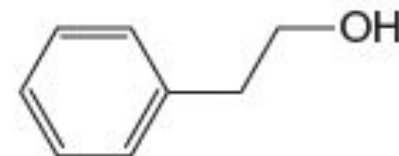
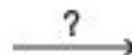
Specify the appropriate alkene and reagents for synthesis of each of the following alcohols by hydroboration–oxidation.



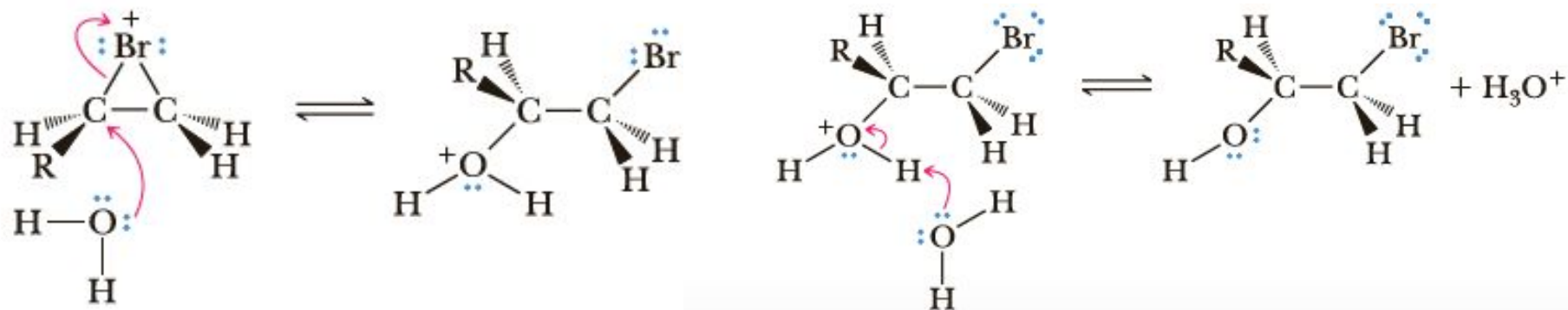
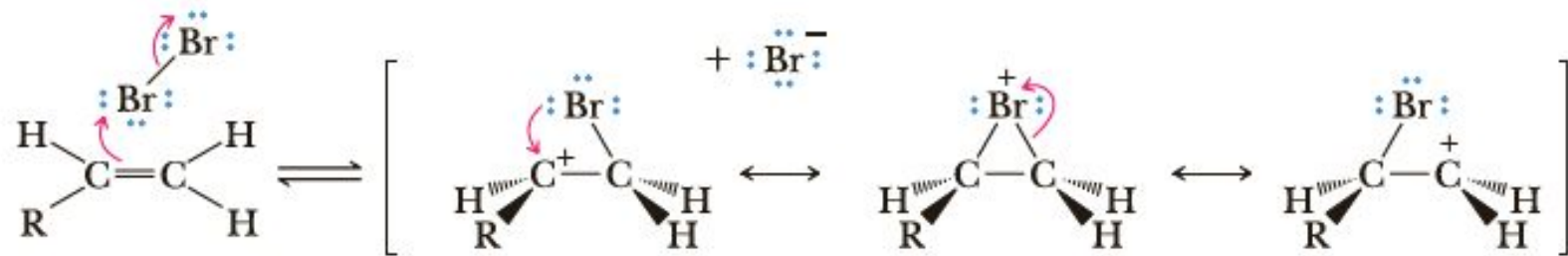
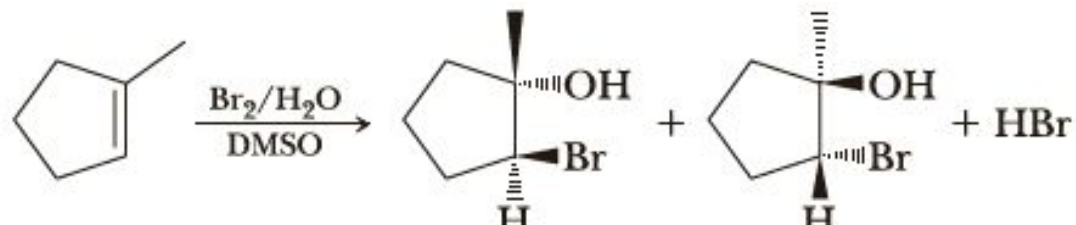
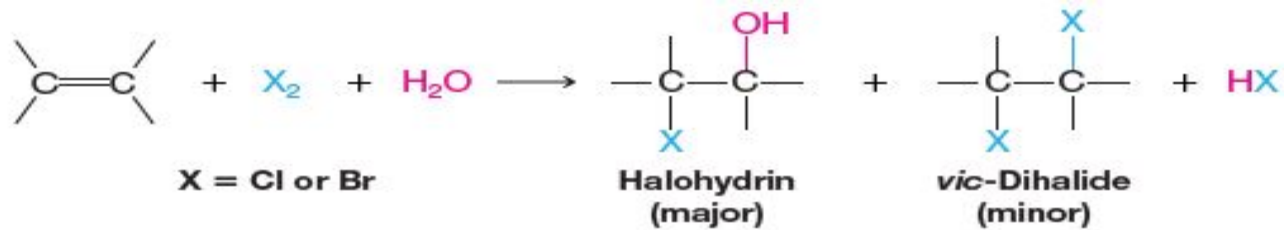
Show how you could synthesize 2-phenylethanol from 1-phenylethanol.

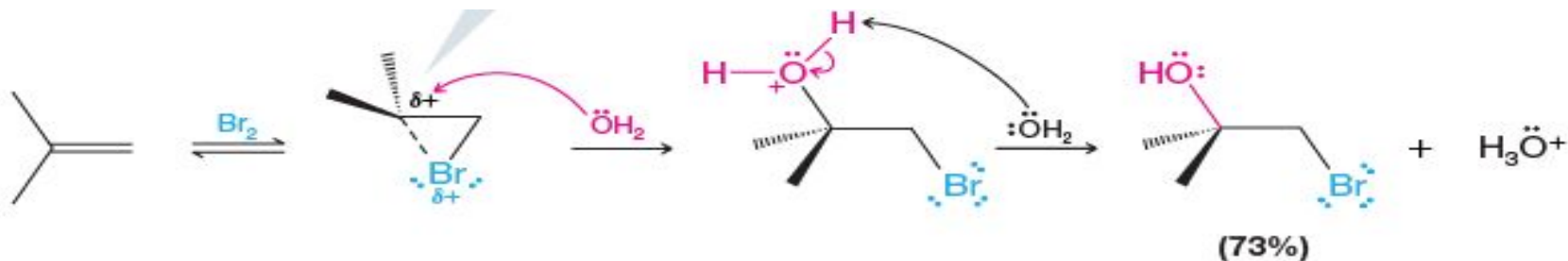


1-Phenylethanol



2-Phenylethanol

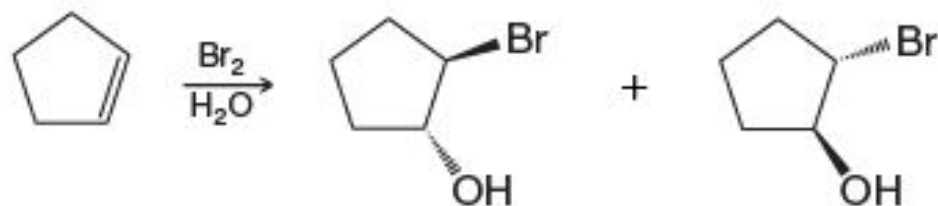




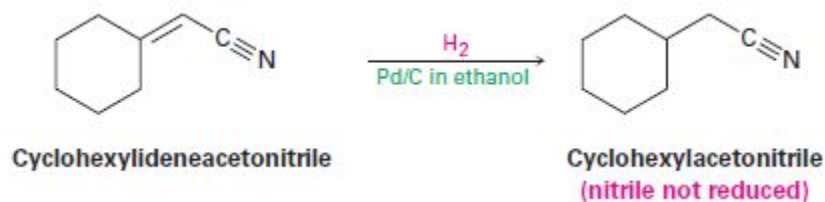
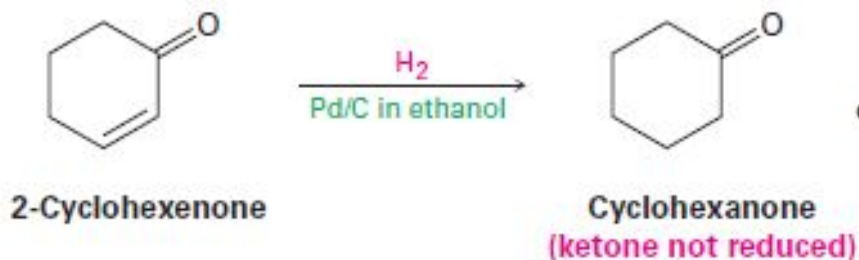
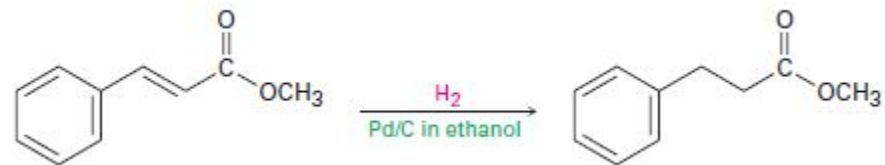
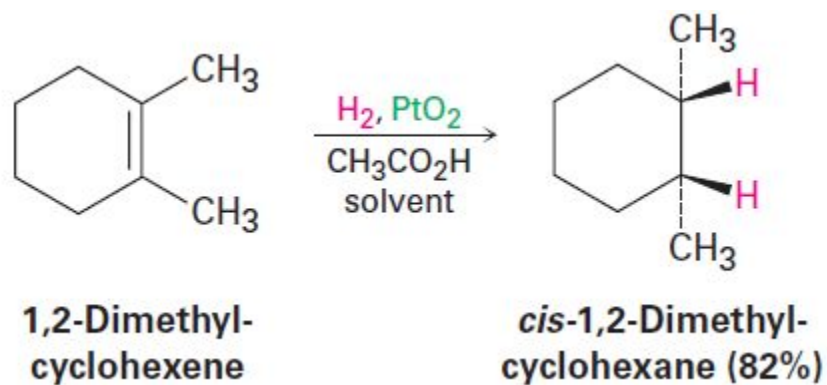
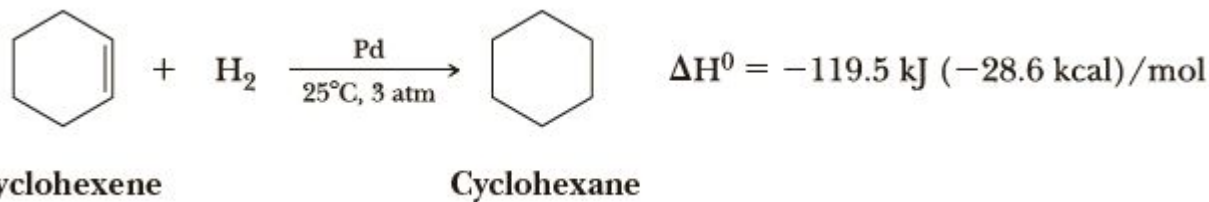
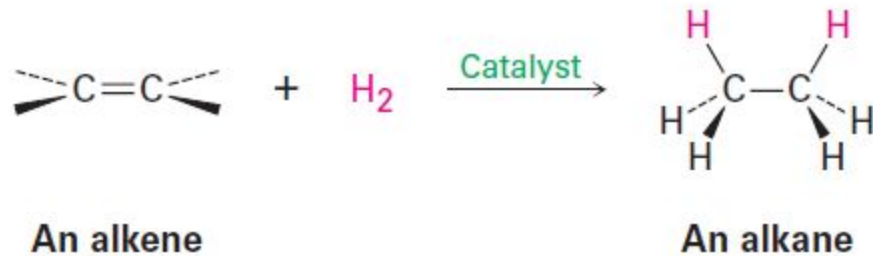
Draw the structure of the bromohydrin formed by treating 2-methylpropene with  $\text{Br}_2/\text{H}_2\text{O}$ .

Draw the structure of the chlorohydrin formed by treating 1-methylcyclohexene with  $\text{Cl}_2/\text{H}_2\text{O}$ .

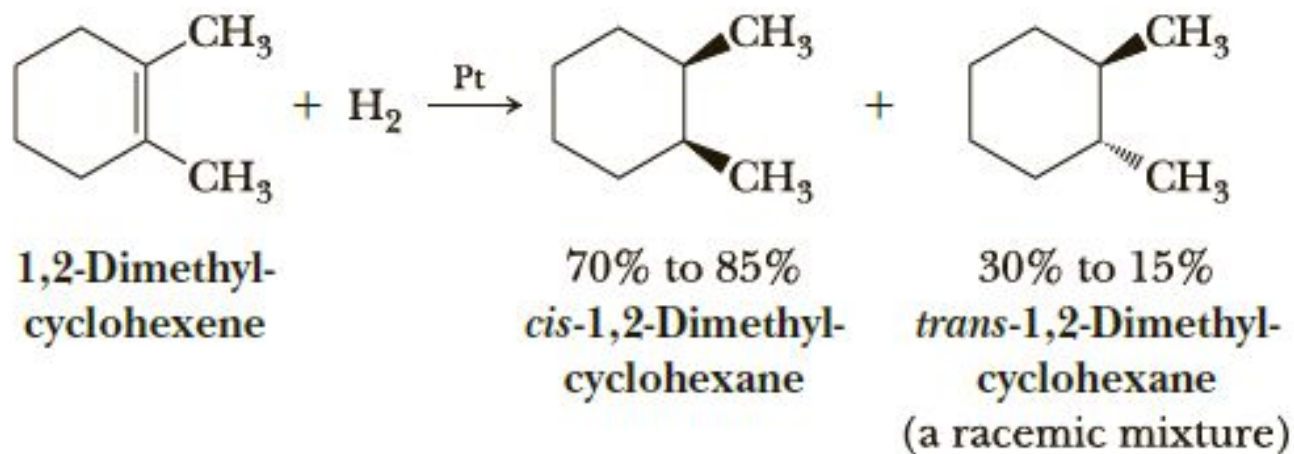
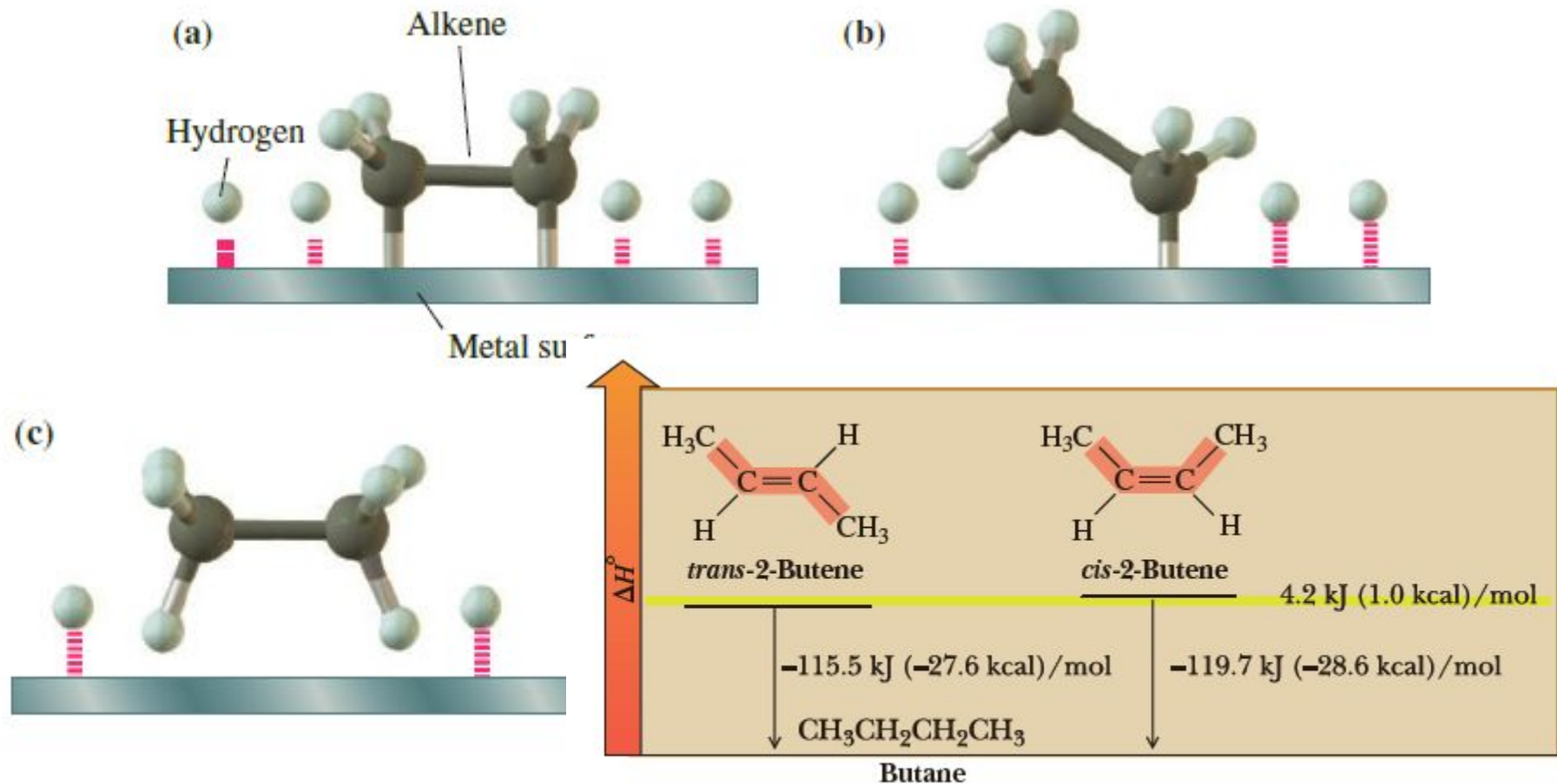
Write a mechanism to explain the following reaction.

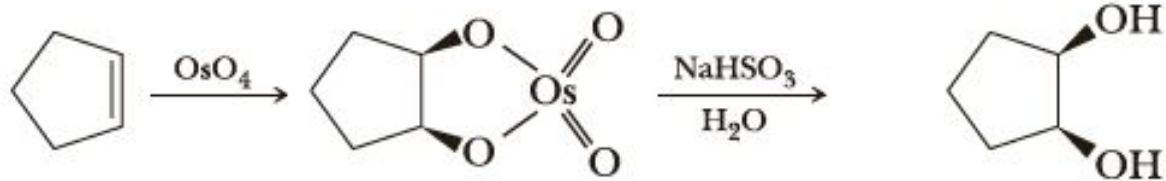


**(as a racemic mixture)**



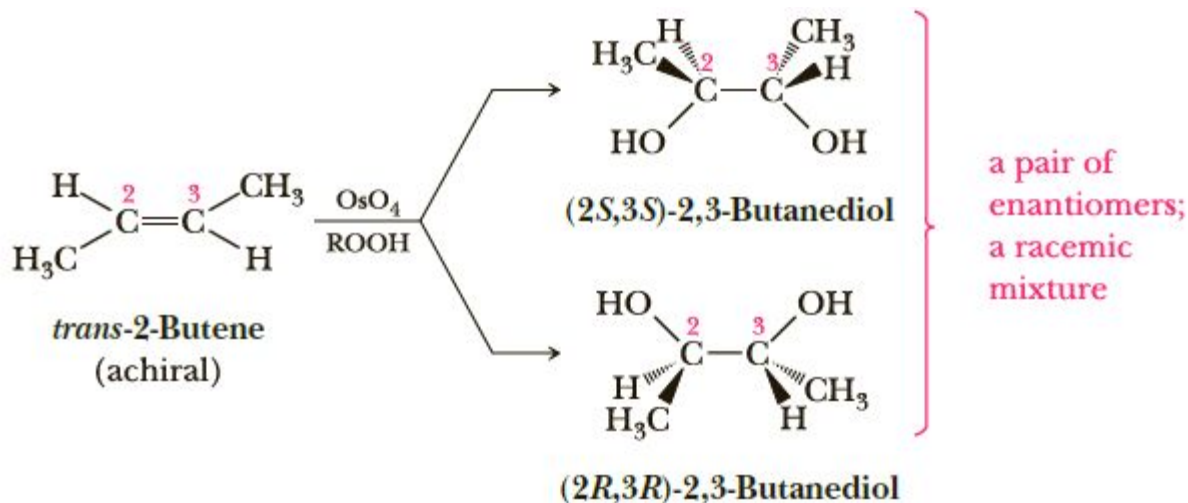
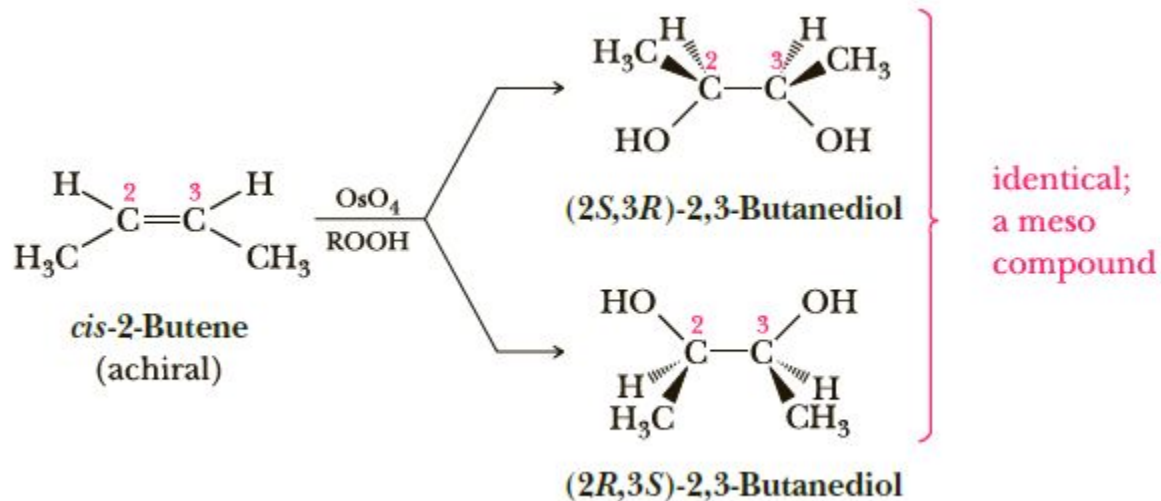




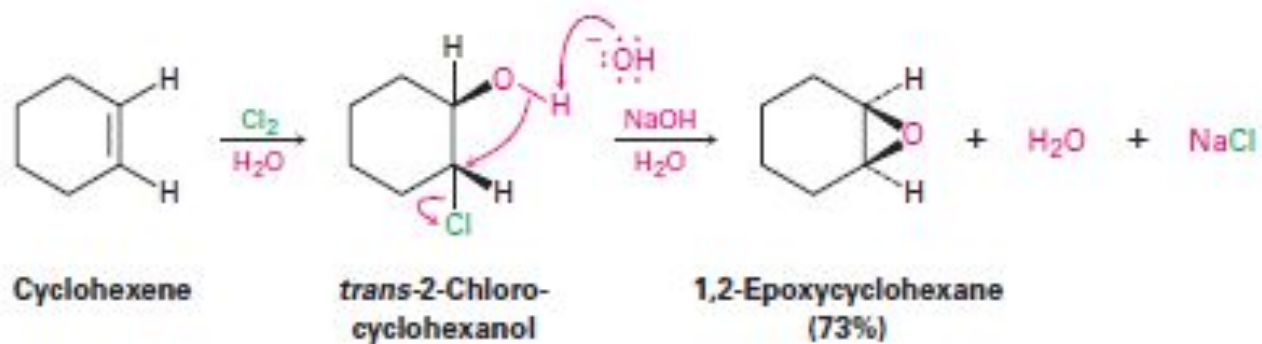
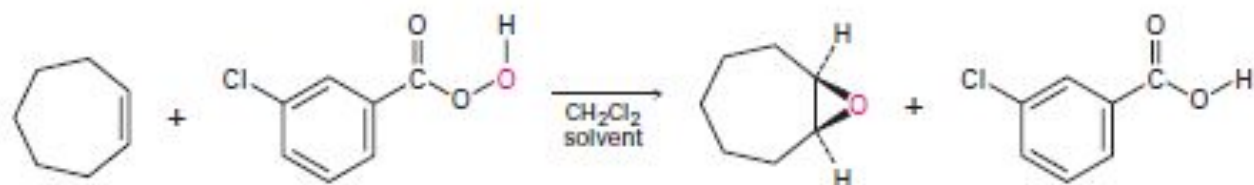
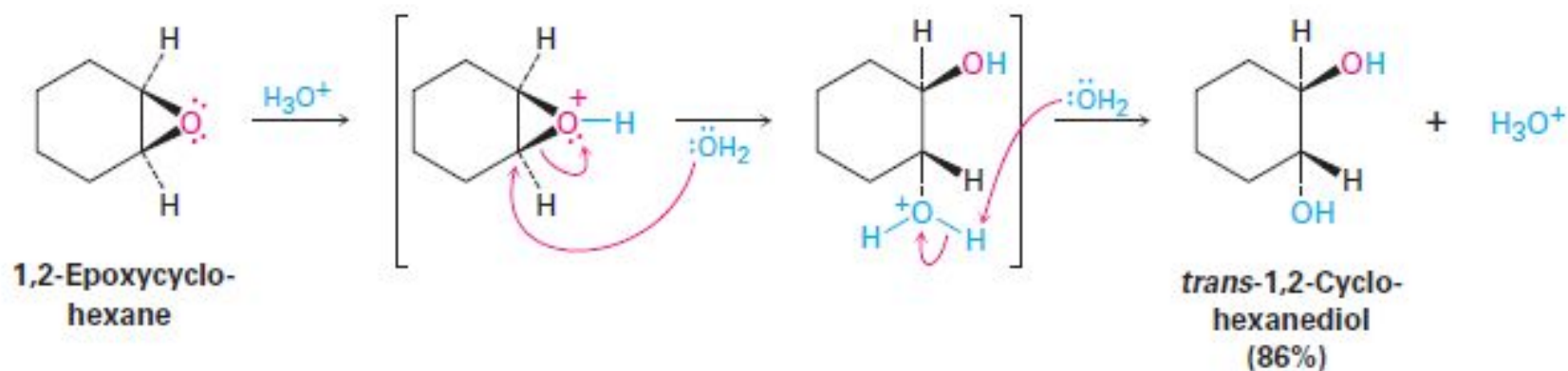
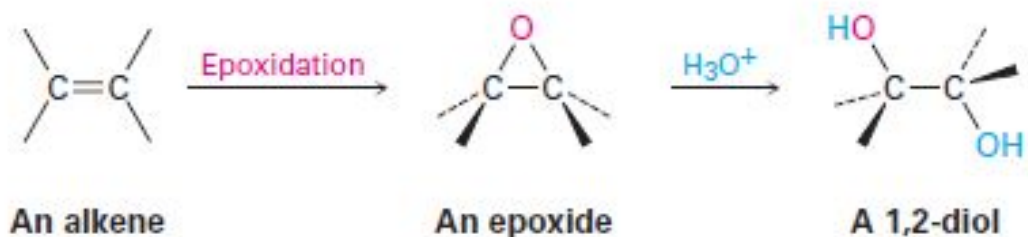


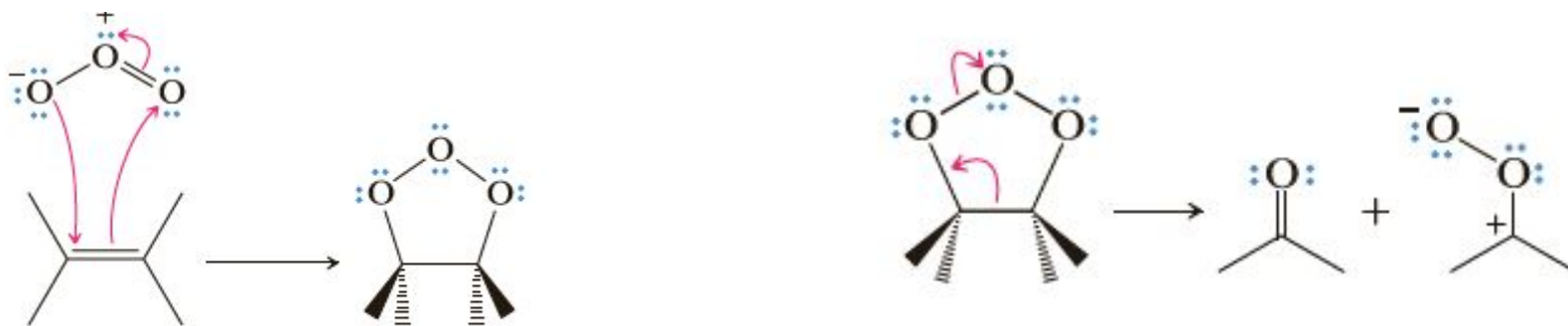
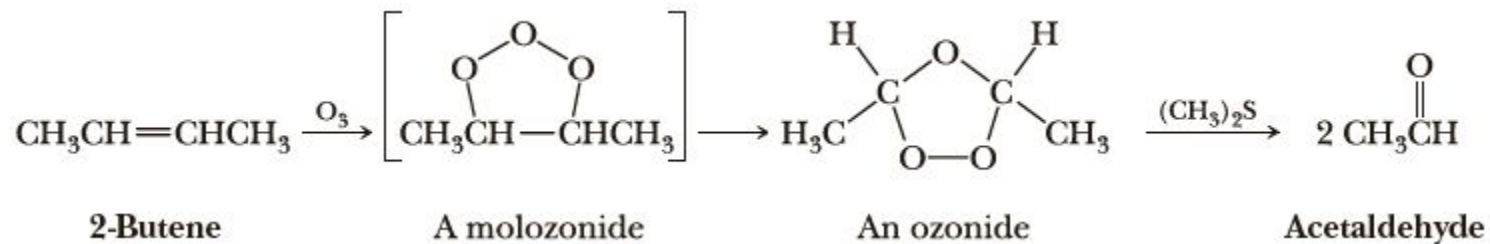
A cyclic osmate

*cis*-1,2-Cyclopentanediol  
(a *cis* glycol)

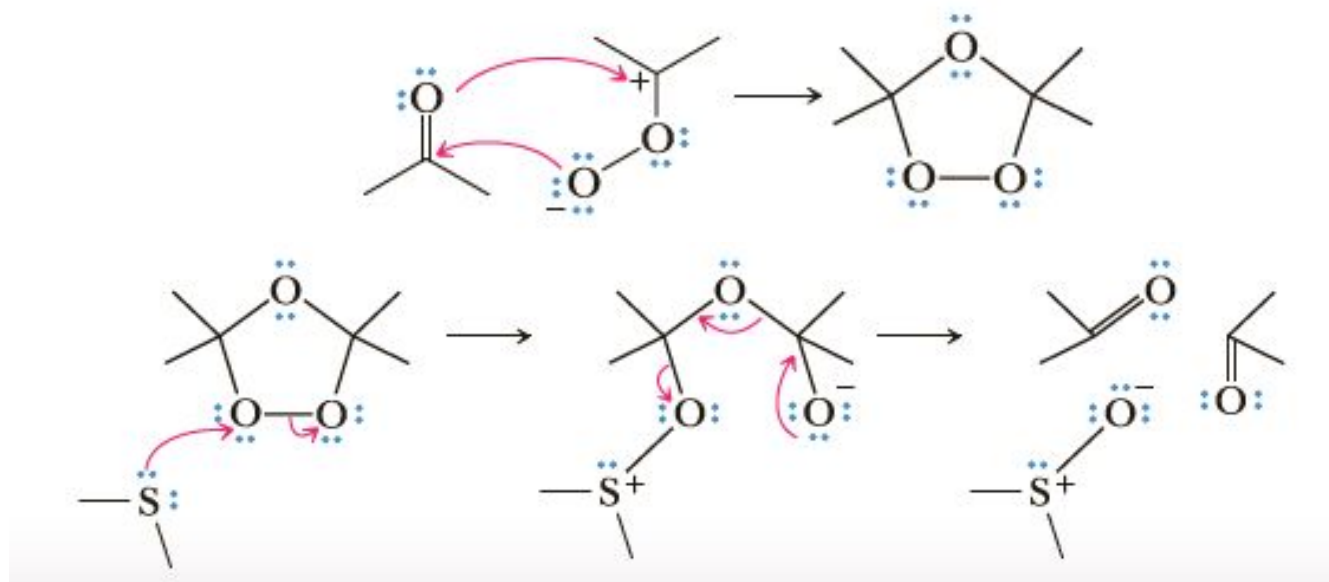




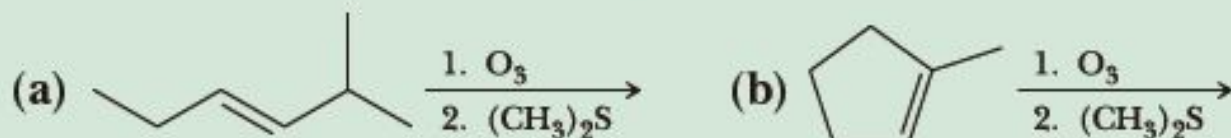




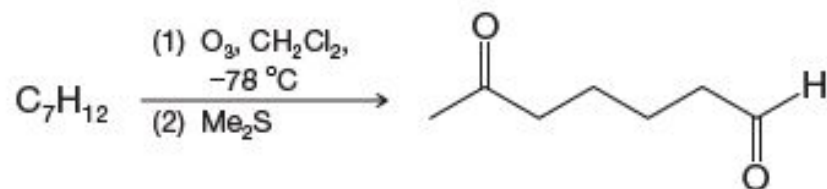
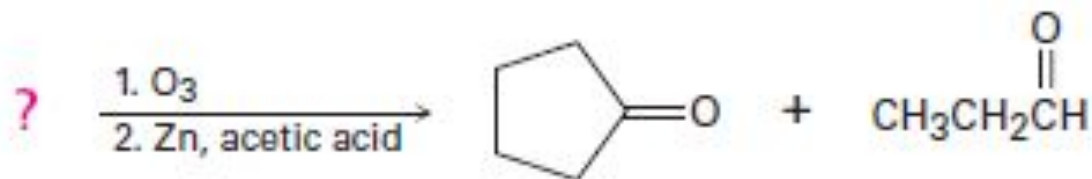
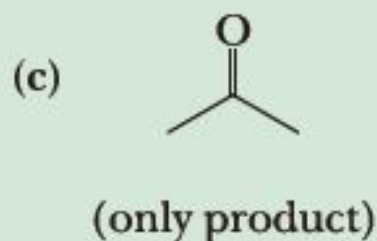
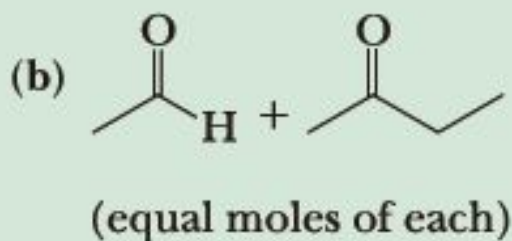
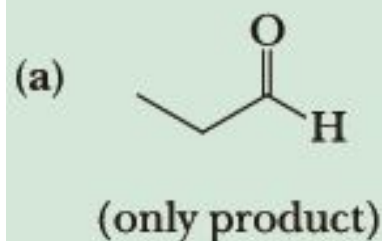
**A molozonide**



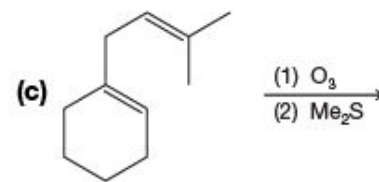
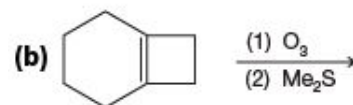
Draw structural formulas for the products of the following ozonolysis reactions and name the new functional groups formed in each oxidation.

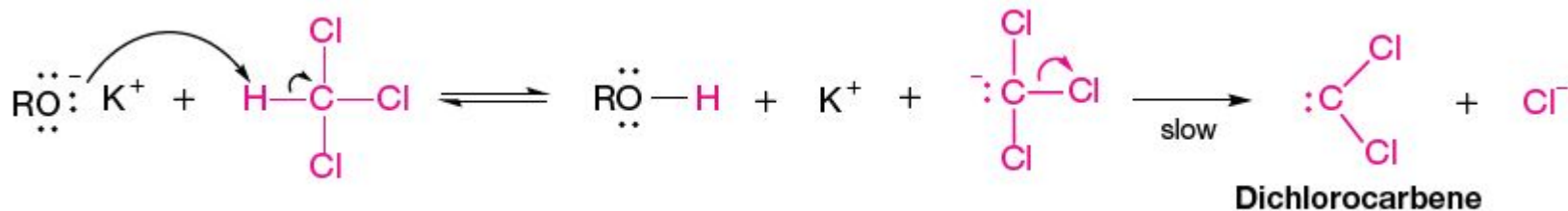
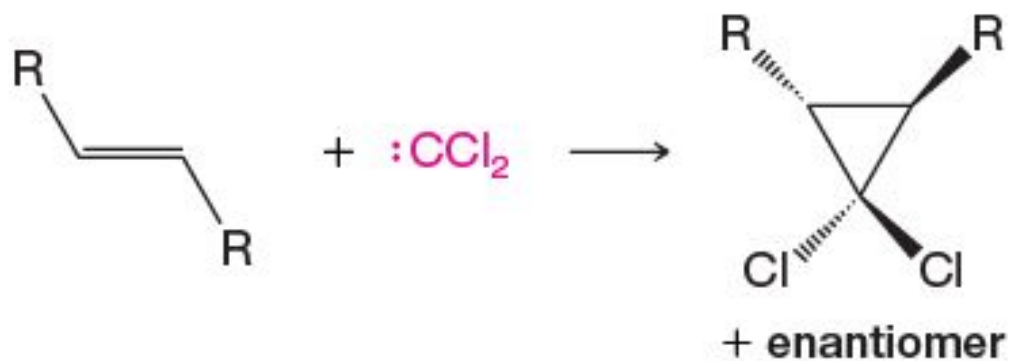
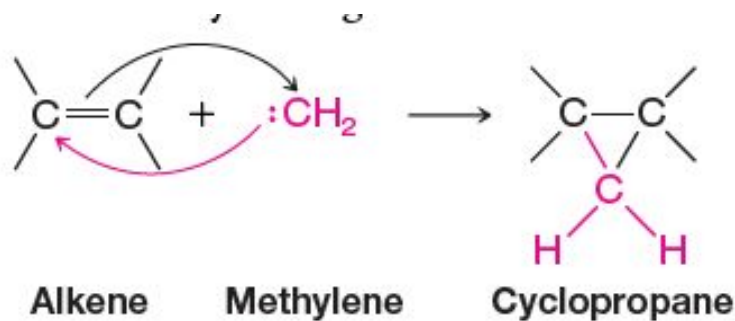
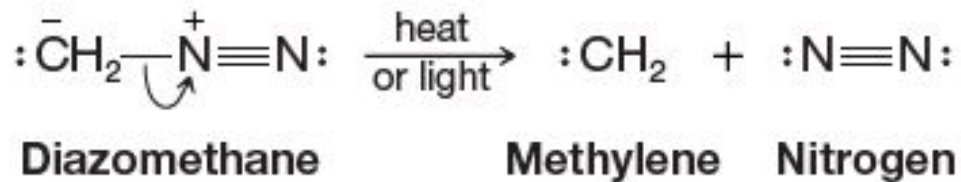


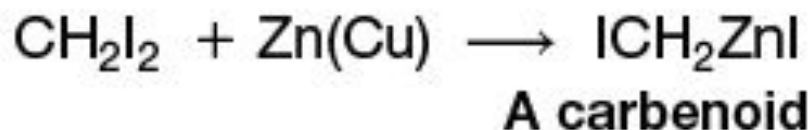
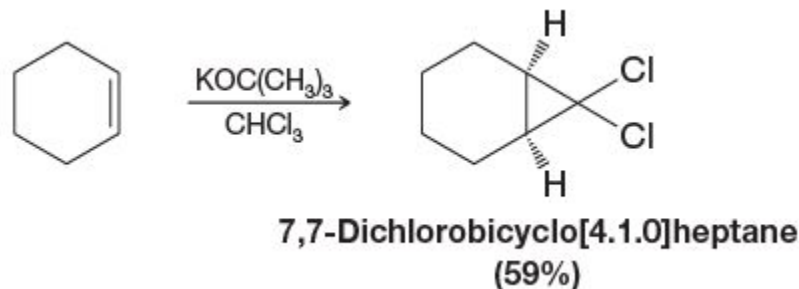
What alkene with the molecular formula  $\text{C}_6\text{H}_{12}$ , when treated with ozone and then dimethyl sulfide, gives the following product(s)?



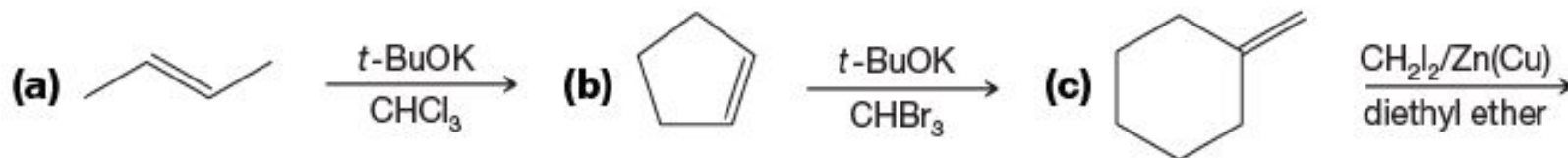
Predict the products of the following ozonolysis reactions.







What products would you expect from each of the following reactions?



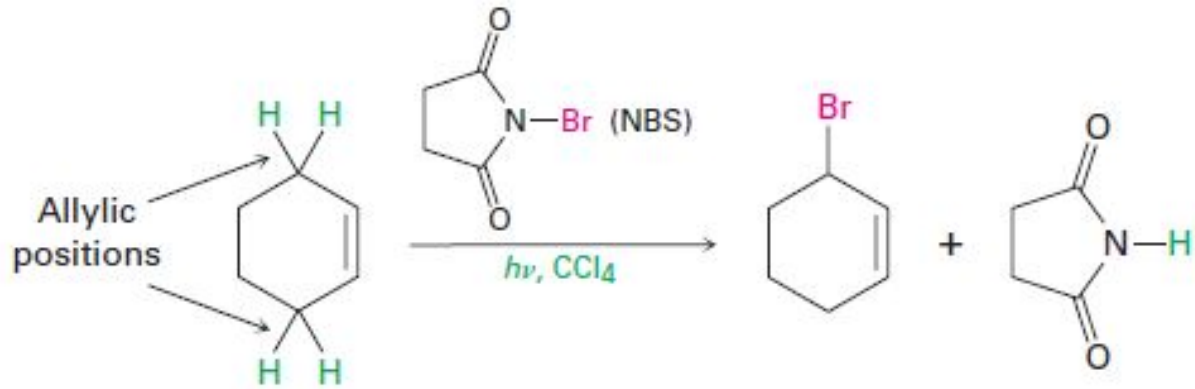
Starting with cyclohexene and using any other needed reagents, outline a synthesis of 7,7-dibromobicyclo[4.1.0]heptane.

.....

Treating cyclohexene with 1,1-diodoethane and a zinc–copper couple leads to two isomeric products. What are their structures?

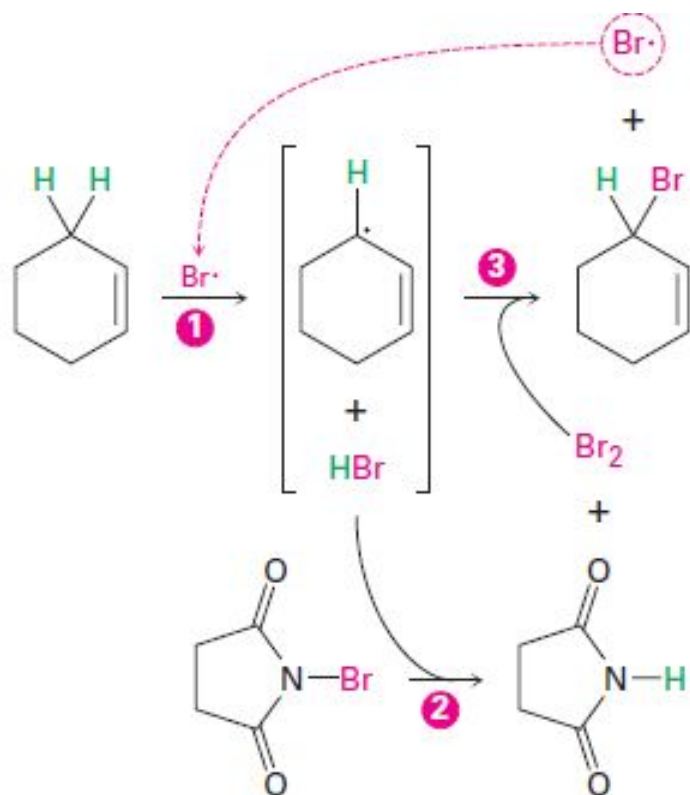
.....

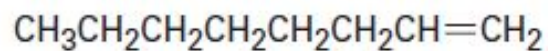
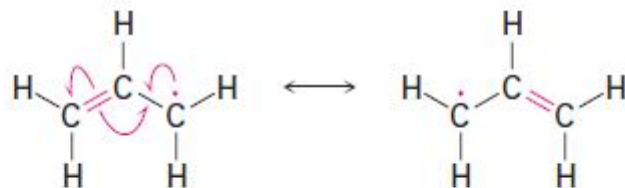
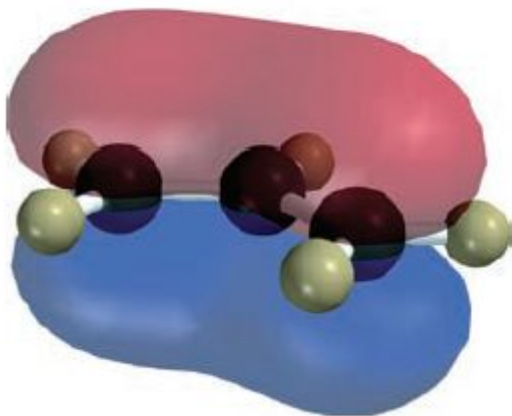
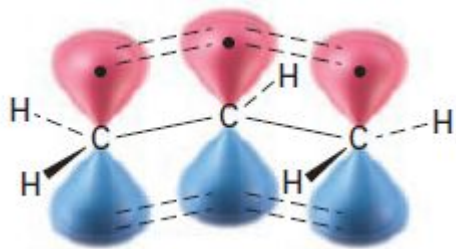




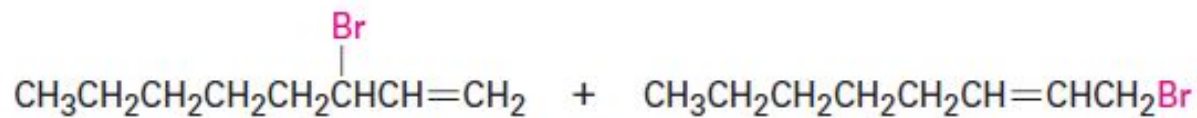
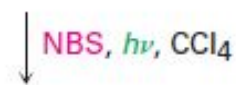
Cyclohexene

3-Bromocyclohexene  
(85%)





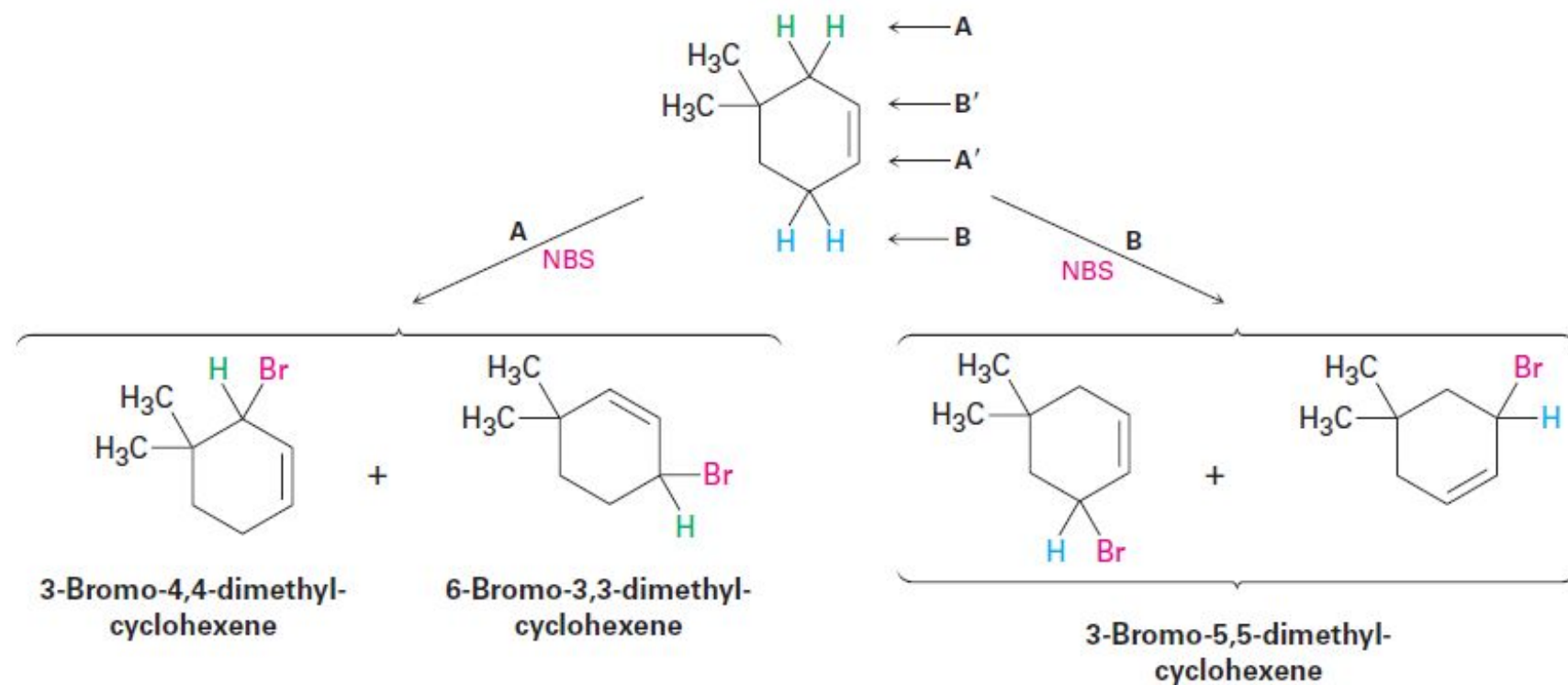
**1-Octene**



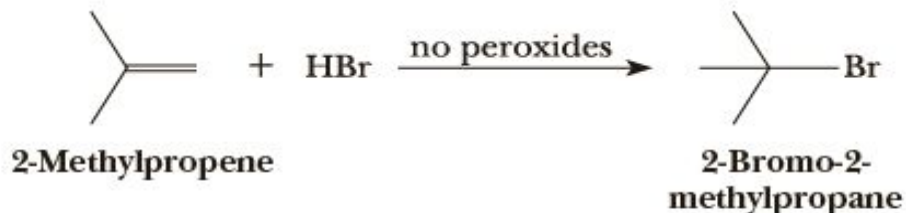
**3-Bromo-1-octene (17%)**

**1-Bromo-2-octene (83%)**  
(53 : 47 trans : cis)

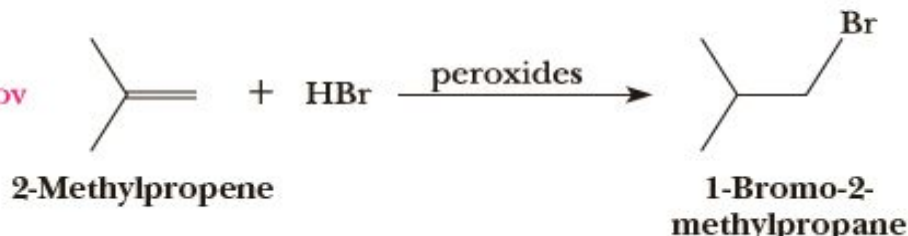
**Solution**



Markovnikov  
addition



Non-Markovnikov  
addition



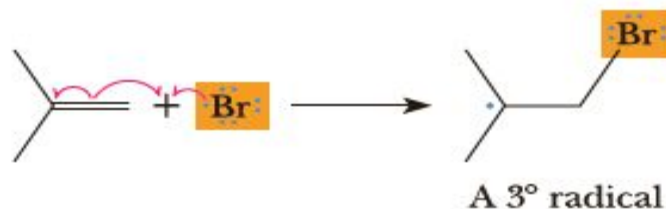
Step 1:



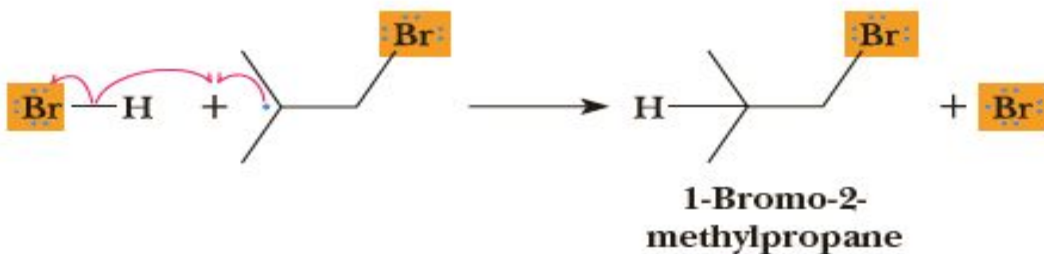
Step 2:

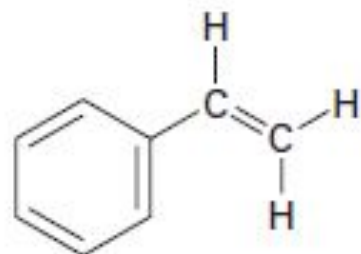


Step 3:

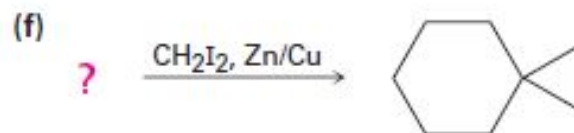
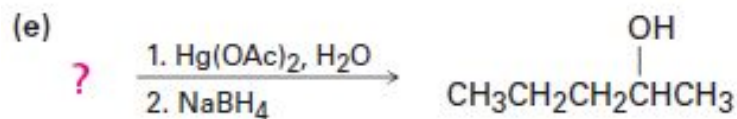
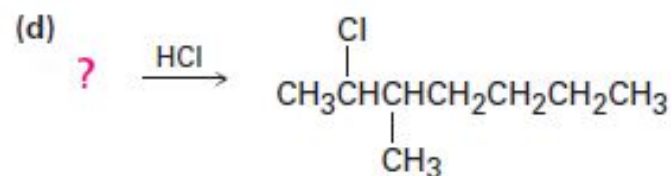
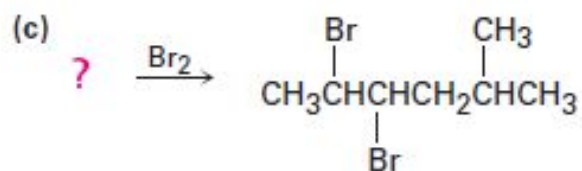
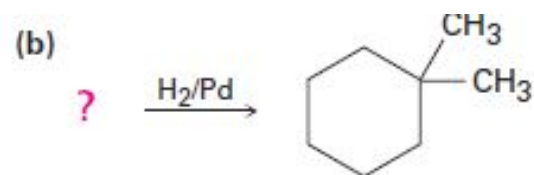
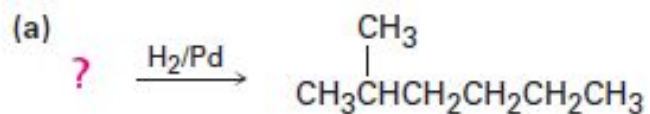


Step 4:

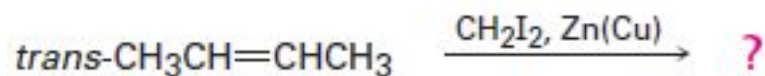
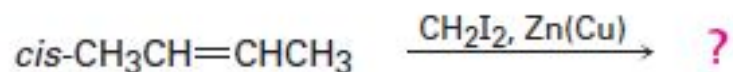




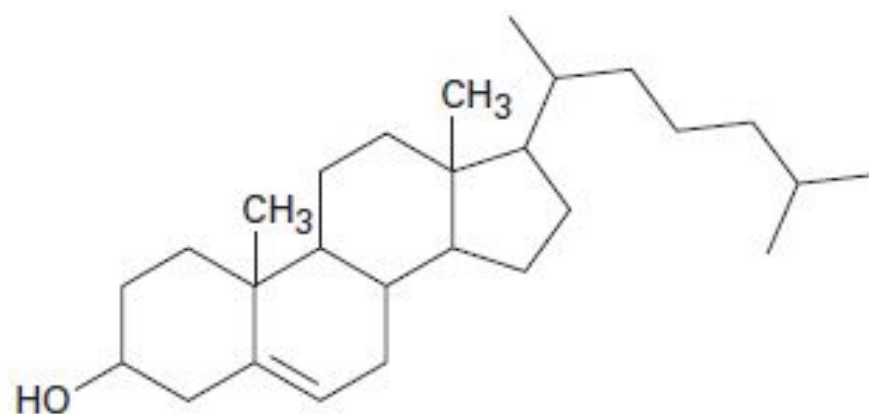
- (a)  $\xrightarrow{\text{H}_2/\text{Pd}}$  ?
- (b)  $\xrightarrow{\text{Br}_2}$  ?
- (c)  $\xrightarrow[\text{NMO}]{\text{OsO}_4}$  ?
- (d)  $\xrightarrow{\text{Cl}_2, \text{H}_2\text{O}}$  ?
- (e)  $\xrightarrow{\text{CH}_2\text{I}_2, \text{Zn}/\text{Cu}}$  ?
- (f)  $\xrightarrow{\text{meta-Chloroperoxybenzoic acid}}$  ?



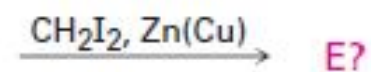
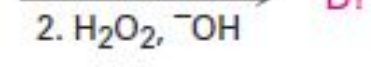
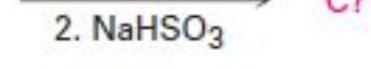
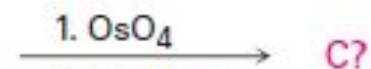
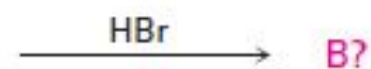
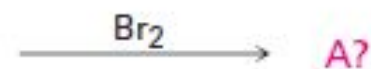
The *cis* and *trans* isomers of 2-butene give different cyclopropane products in the Simmons–Smith reaction. Show the structures of both, and explain the difference.

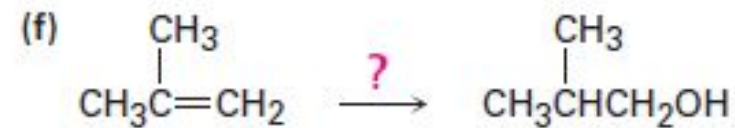
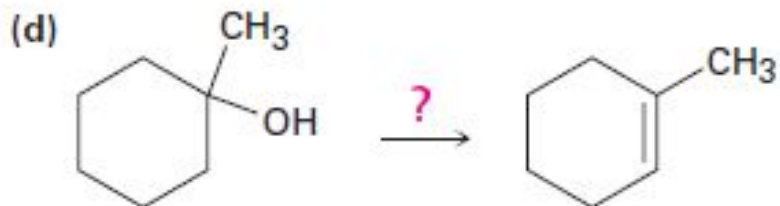
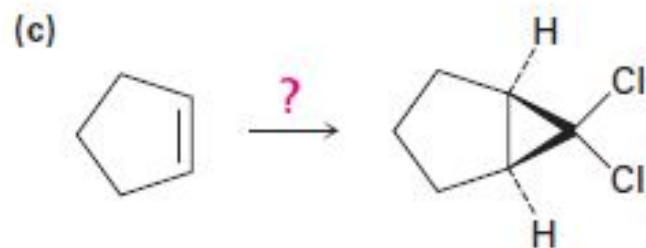
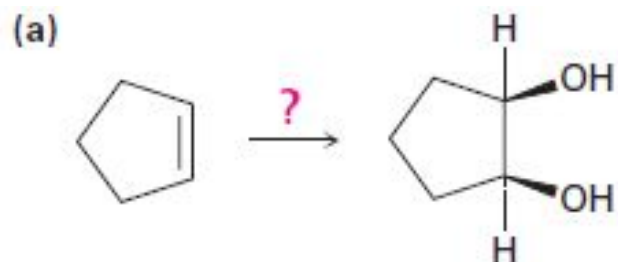


Predict the products of the following reactions. Don't worry about the size of the molecule; concentrate on the functional groups.

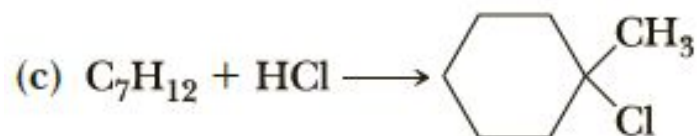
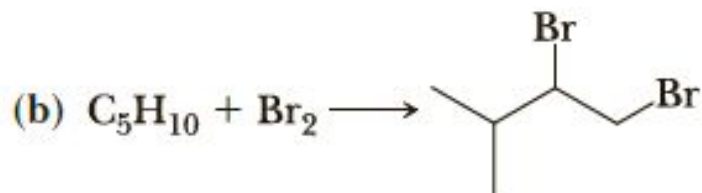
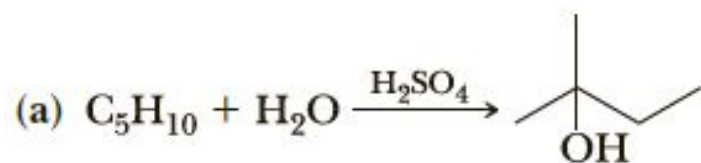


**Cholesterol**

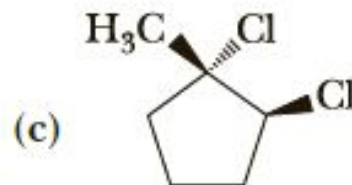
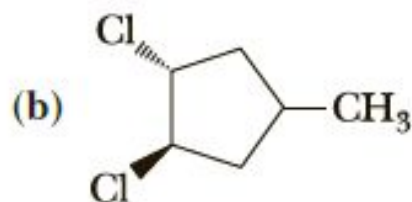
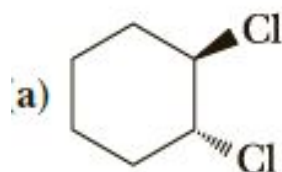




Draw a structural formula for an alkene with the indicated molecular formula that gives the compound shown as the major product (more than one alkene may give the same compound as the major product).

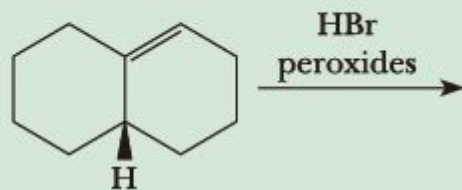


Draw a structural formula for the cycloalkene with the molecular formula  $C_6H_{10}$  that reacts with  $Cl_2$  to give each compound.

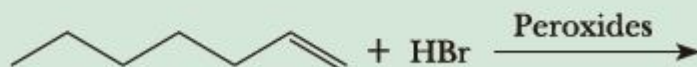




Predict the product of the following reaction:



Predict the major product of the following reaction:



What products would you expect from reaction of the following alkenes with NBS? If more than one product is formed, show the structures of all.

