

CHEM 3332 Honors
Homework for Epoxides, Ethers, and Thioethers

1. Draw a Lewis dot diagram for the following.

A. Diethyl ether

D. 2-ethoxypentane

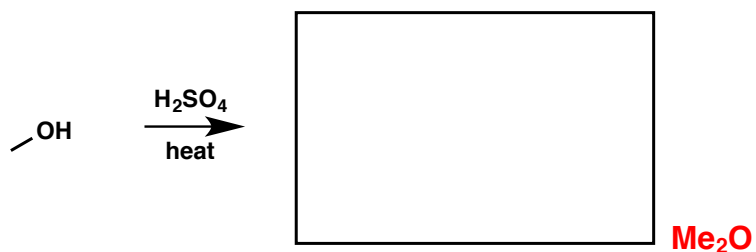
B. isopropyl pentyl ether

E. methoxycyclohexane

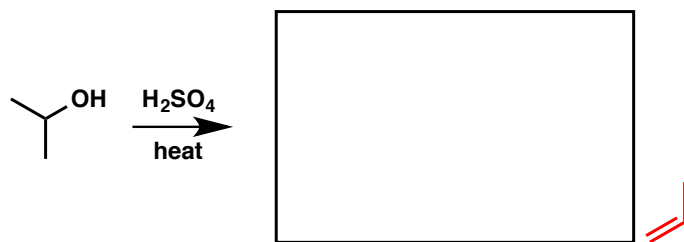
C. methyl vinyl ether

2. Predict the major product for these reactions. Don't forget to show the stereochemistry in the products if the reaction is stereoselective.

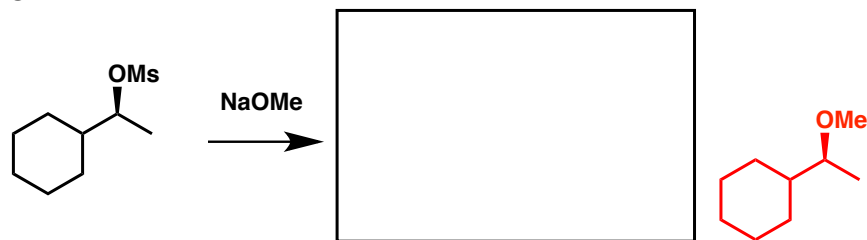
A.



B.

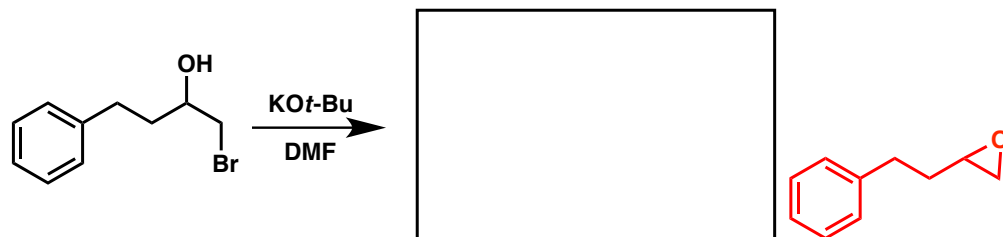


C.

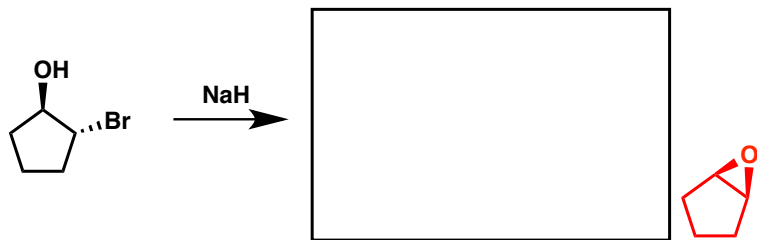


What is the major byproduct of this reaction?

D.



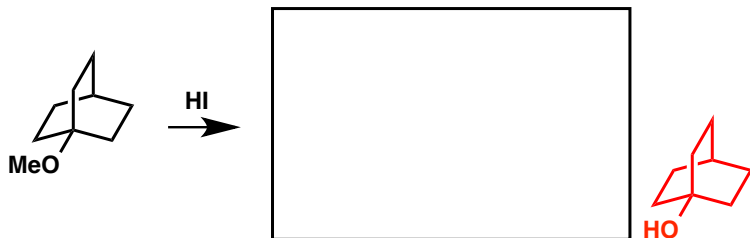
E.



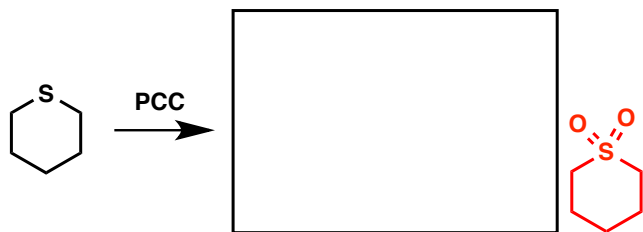
F.



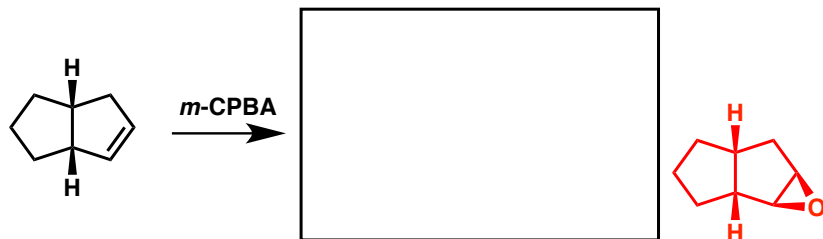
G.



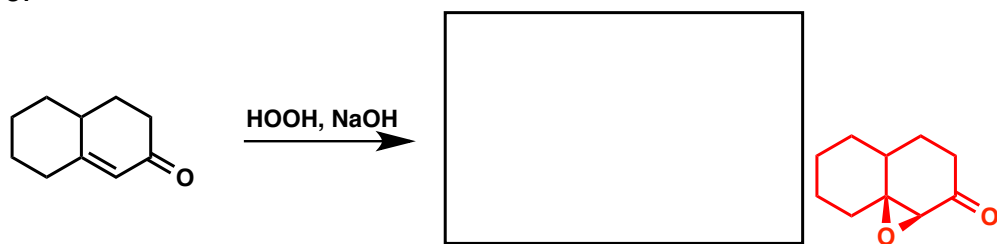
H.



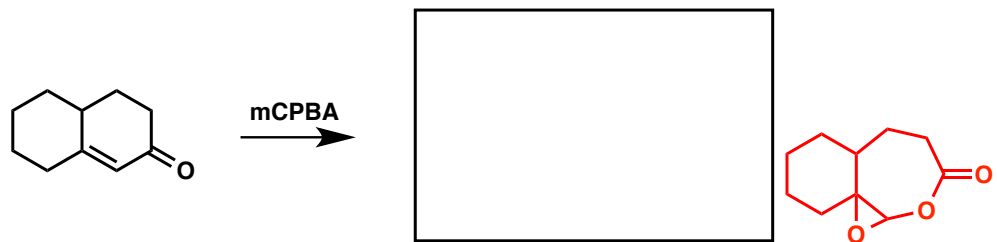
I.



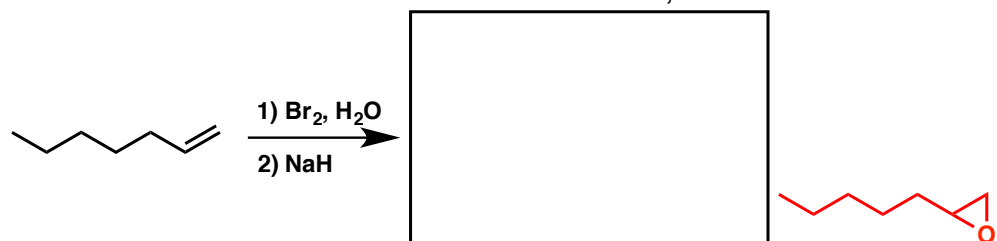
J.



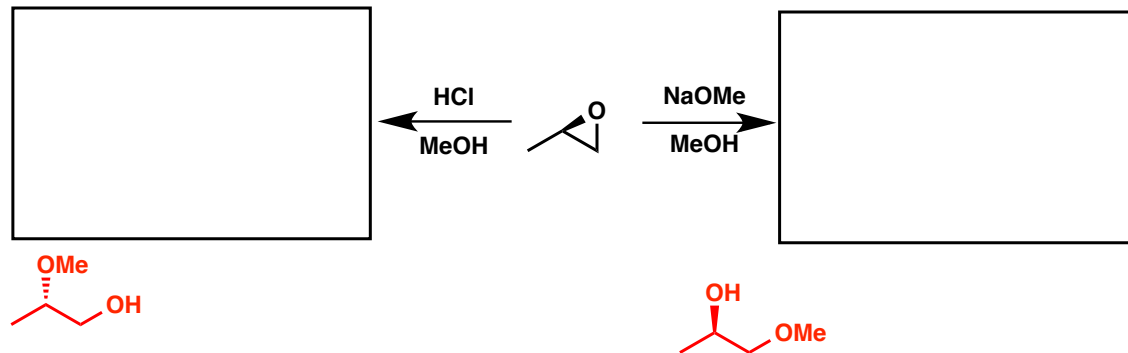
K.



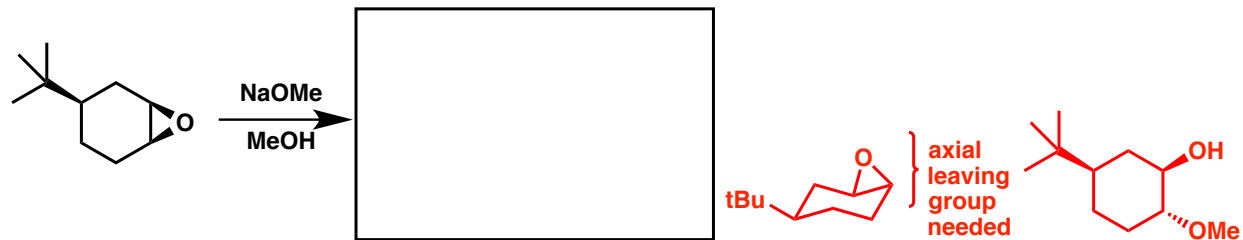
L. Show the mechanism for this transformation, also.



M.



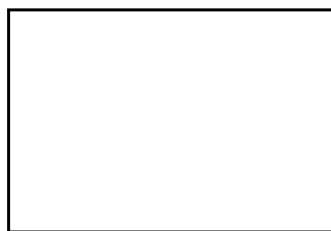
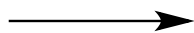
N.



O.



HBr (gas)



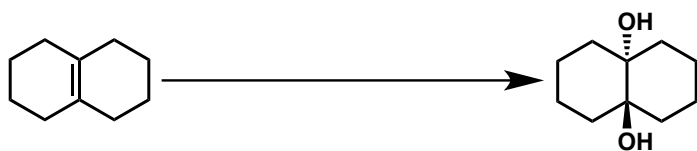
P.



HBr (aqueous)



I.



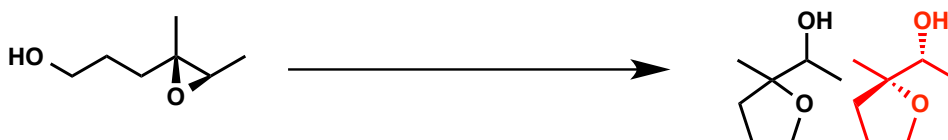
1) mCPBA
2) HCl, H₂O

J.



NaH, heat

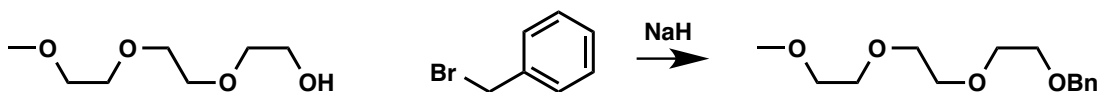
K.



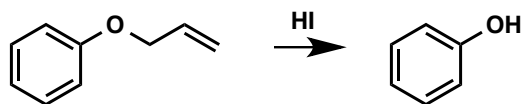
BF₃·OEt₂

4. Propose a mechanism for these reactions.

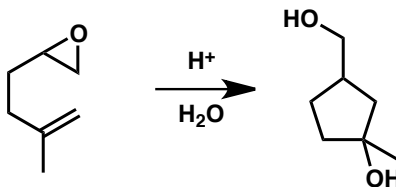
A.



B.

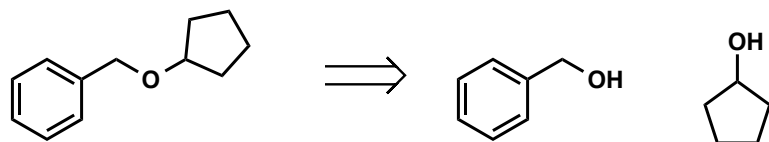


C. The following reaction resembles the acid-catalyzed cyclization of squalene oxide, which is key to the synthesis of steroids.



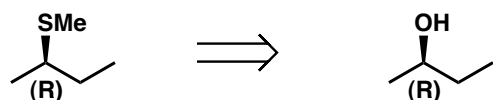
5. Give the transformations and reagents necessary to synthesize the compounds on the left from the compounds on the right.

A.



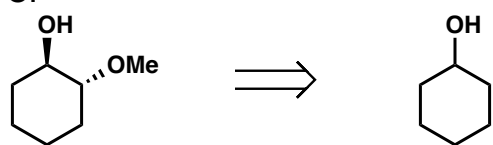
- 1) PhCH₂OH + TsCl, NaH
- 2) NaH, C₅H₉OH

B.



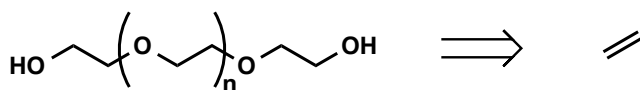
- 1) TsCl, NaH
- 2) Bu₄NI, acetone
- 3) NaSMe

C.



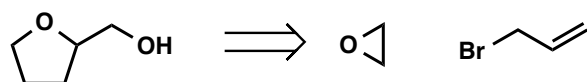
- 1) H₂SO₄
- 2) mCPBA
- 3) HCl, MeOH

D.



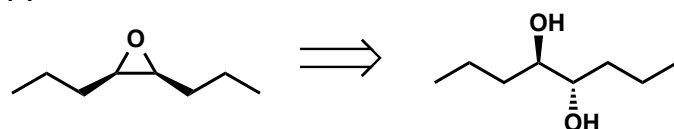
- 1) mCPBA
- 2) BF₃·OEt₂

E.



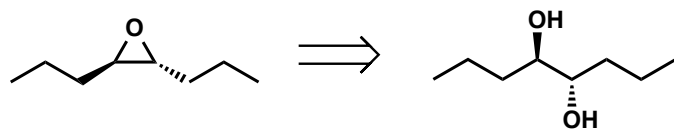
- 1) Mg⁰, then ethylene oxide
- 2) mCPBA
- 3) BF₃·OEt₂

F.



- 1) SO₂Cl₂ (or 1 equiv NaH; TsCl)
- 2) KOH
- 3) 1 equiv NaH; TsCl
- 4) NaH

G.

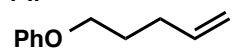


1) 1 equiv NaH; TsCl

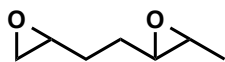
2) NaH

6. Synthesize the following products using reasonable starting materials of 4 carbons or less. You may synthesize them having any stereochemistry.

A.



B.



C.

