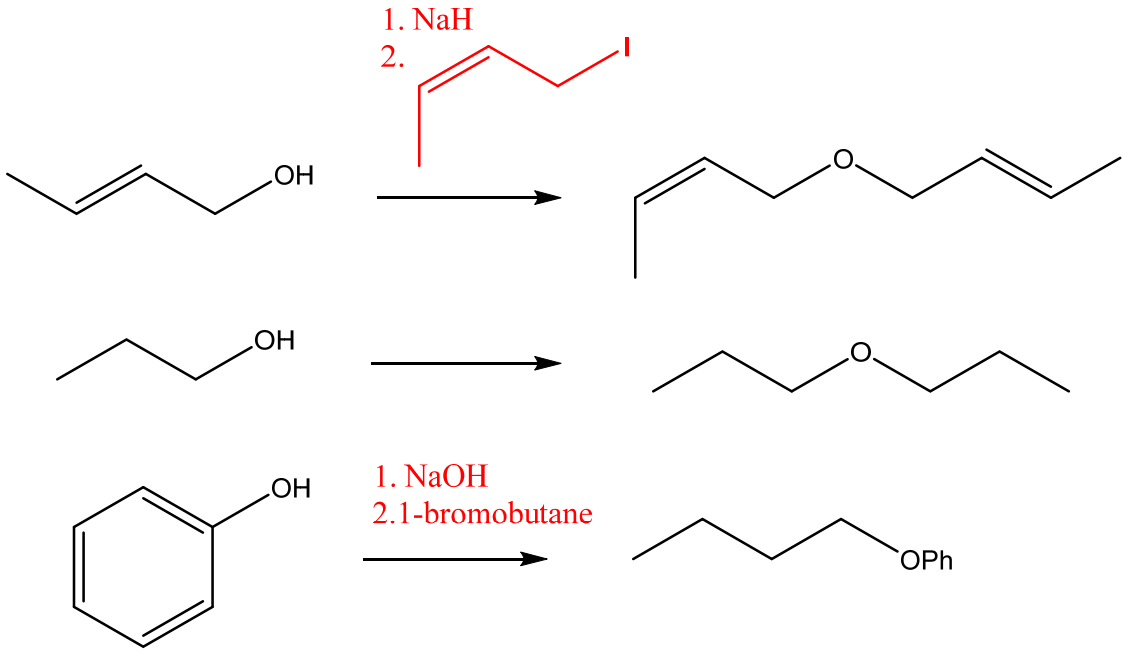
Discussion Review 3
Ethers and Epoxides

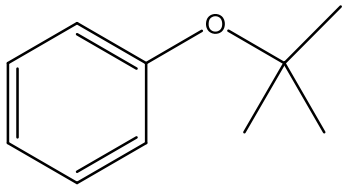
Skill 1: Apply substitution mechanisms to ether formation and cleavage

- Williamson ether synthesis is Sn2 in mechanism, so it is controlled by all the typical factors in Sn2 reactions
- Ether cleavage with concentrated HX can go through Sn1 and/or Sn2 mechanism depending on the substrate

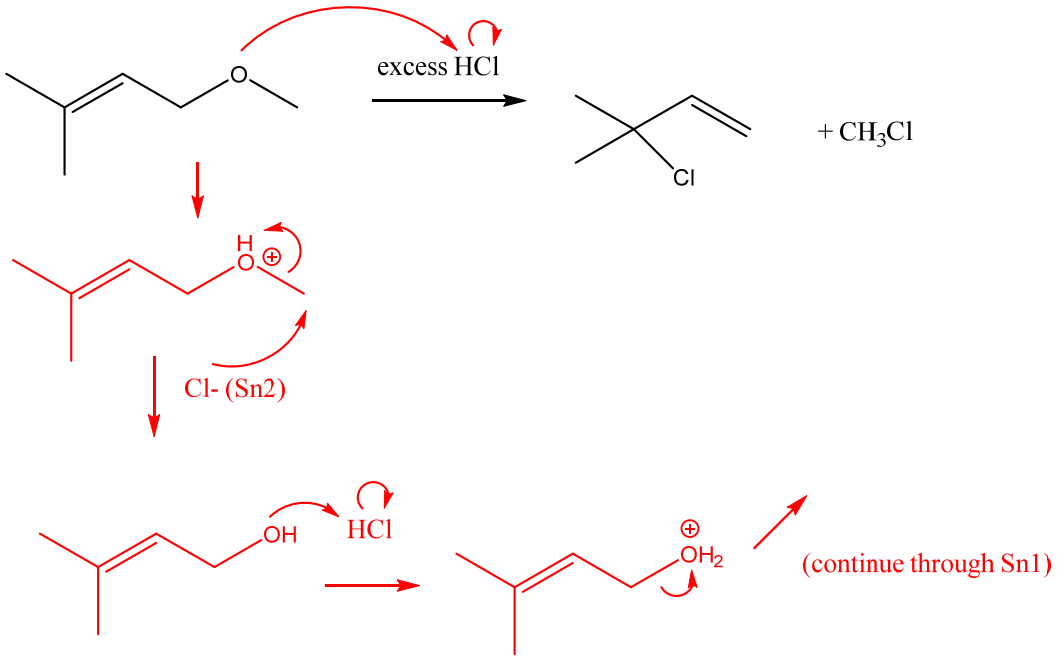
Problem 1. Provide reagents for these Williamson ether syntheses.



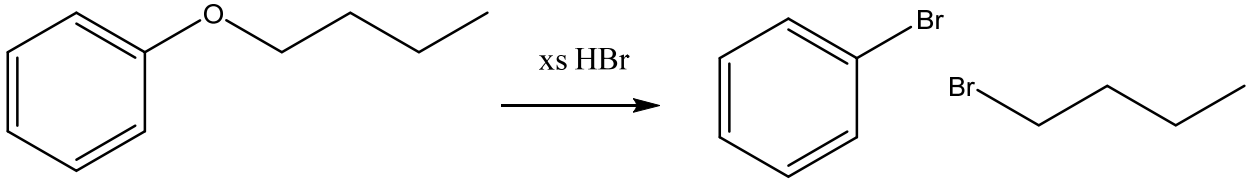
Problem 2. This ether cannot be made through Williamson ether synthesis. Explain.

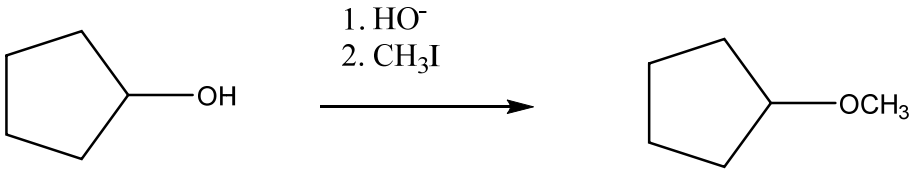


Problem 3. Provide a mechanism for this ether cleavage reaction.

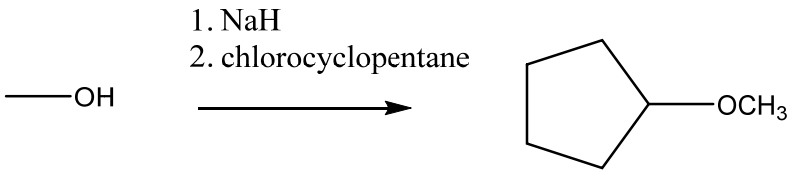


Problem 4. Explain why these reactions do not produce the indicated major product(s).





The base is too weak to form alkoxide

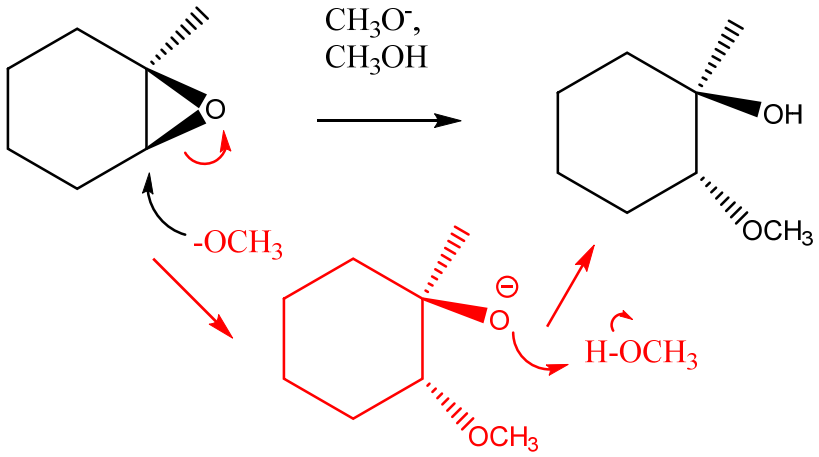


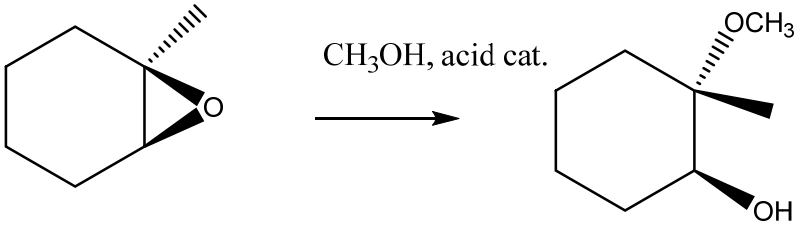
Treating a secondary chloride with methoxide will lead to more E2 than Sn2 produc t (steric hinderance)

Skill 2: Epoxides can be opened under acidic or basic conditions

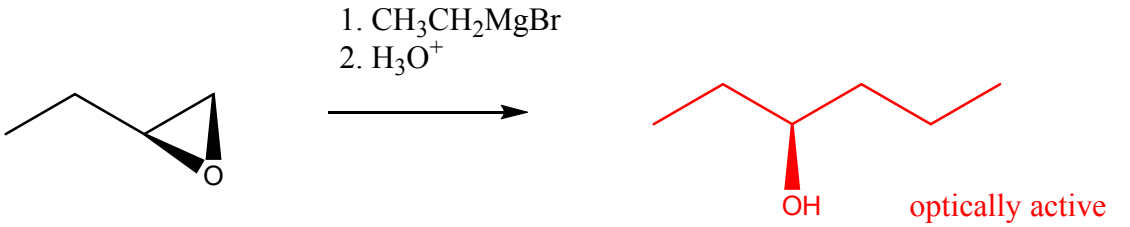
- Under acidic conditions, regiochemistry favors nucleophilic attack on the tertiary carbon due to the partial positive charge
- Under basic conditions, regiochemistry favors nucleophilic attack on the less substituted carbon due to steric factors
- Stereochemistry is *anti* under both acid and base conditions

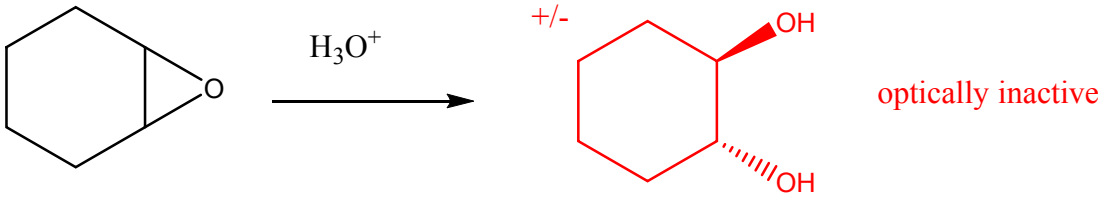
Problem 5: Provide a mechanism for each reaction that accounts for the observed stereochemistry and regiochemistry.

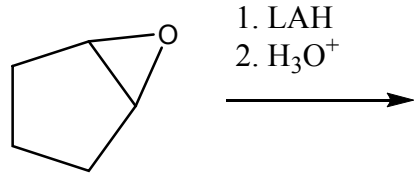


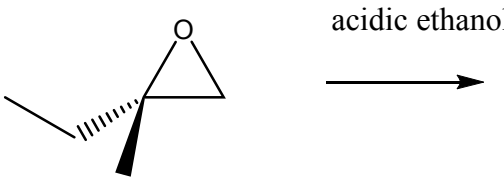


Problem 6. Predict the products. Indicate appropriate stereochemistry, and describe the product as optically active or optically inactive.









Problem 7. Provide appropriate reagents for the following reactions.