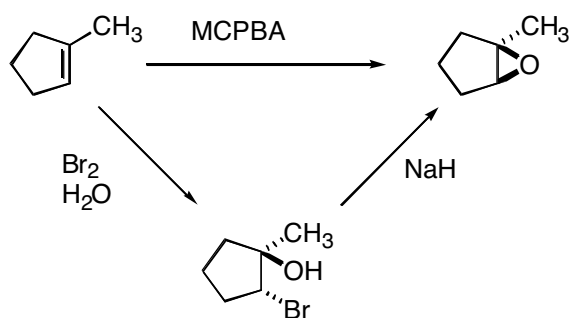


These notes can be obtained at: <http://www.ndsu.nodak.edu/instruct/grcook/chem342/notes.shtml>

## Chapter 18: Ethers and Epoxides; Thiols and Sulfides

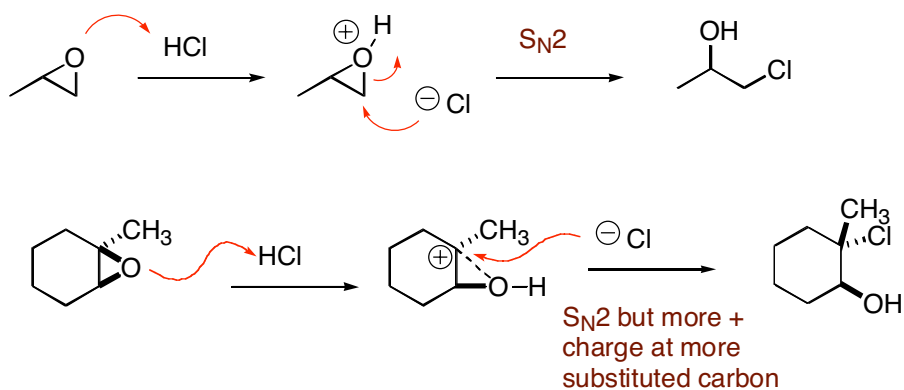
### Preparation of Epoxides

Epoxides can be made in one step by reaction with meta-chloroperoxybenzoic acid (MCPBA). This is a stereospecific reaction and both C-O bonds are formed at the same time. They can also be prepared in two steps by formation of a halohydrin followed by treatment with NaH (a Williamson Ether Synthesis).

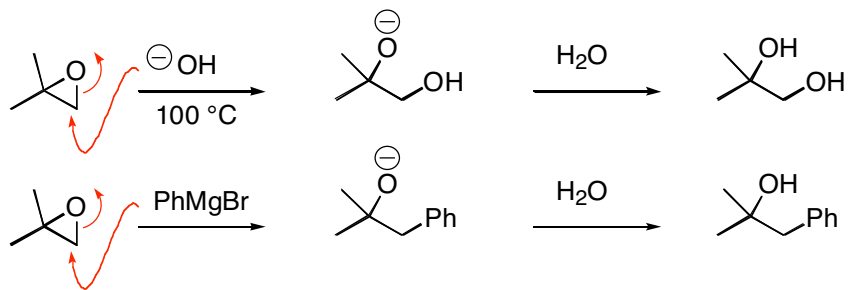


### Reactions of Epoxides

Epoxides are more reactive than typical ethers due to ring strain. Under acidic conditions, primary and secondary protonated epoxides will be attacked by nucleophiles via a  $\text{S}_{\text{N}}2$  mechanism - thus the nucleophile will add to the less hindered carbon. If there is a tertiary carbon in the epoxide, there will be more positive charge at that carbon so nucleophiles will add to the more hindered carbon. Note that this is still a stereospecific anti addition as there is not a full carbocation formed. It is somewhere in between a  $\text{S}_{\text{N}}2$  and  $\text{S}_{\text{N}}1$  mechanism.

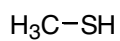


Base catalyzed or nucleophilic opening of epoxides can be done, but it is more difficult.

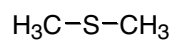


### Thiols and Sulfides

The sulfur analogs of alcohols are called thiols and the sulfur analogs of ethers are called sulfides.



methanethiol



dimethylsulfide