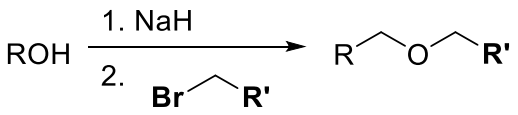
Chapter 13 – Ethers & Epoxides

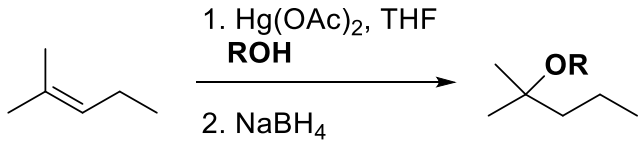
13.1 Intro to Ethers	13.2 Ether Nomenclature	13.3 Ether Structure & Properties
13.5 Preparation of Ethers	13.6 Reactions of Ethers	13.7 Epoxide Nomenclature
13.8 Preparation of Epoxides	13.10 Ring-Opening Reactions of Epoxides	13.12 Synthesis Strategies

13.5 PREPARATION OF ETHERS

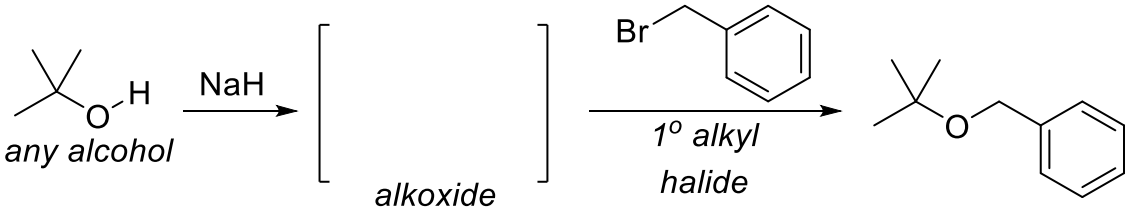
Williamson Ether (WE) Synthesis

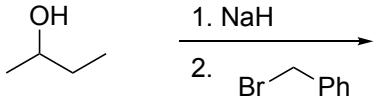


Alkoxymercuration

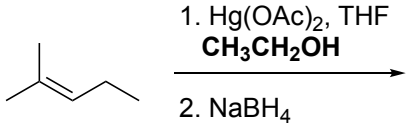


WE Synthesis: Alkoxide attacks alkyl halide





Alkoxymercuration: Alcohol adds to alkene

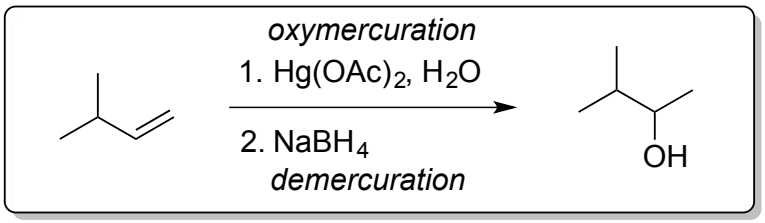


Recall oxymercuration / demercuration from Chapter 8…

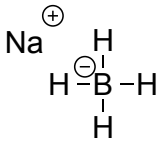
catalyst dissociates:

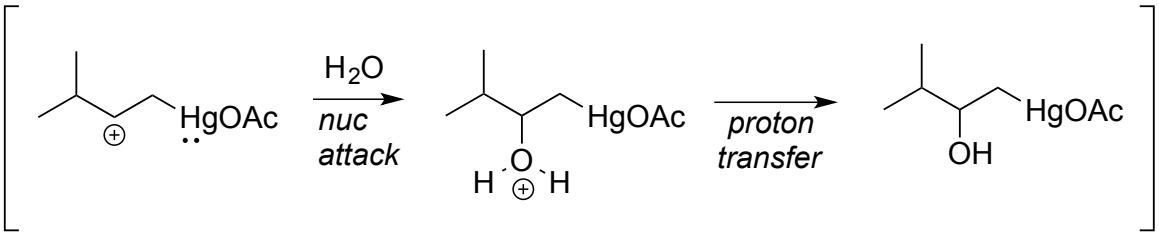
$^{\oplus}HgOAc$

$^{\ominus}OAc$



sodium boro**hydride**



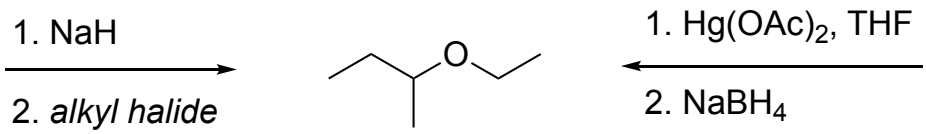


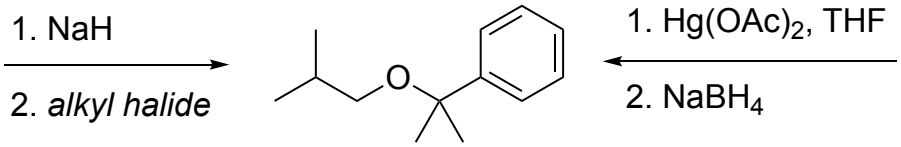
You're not responsible for this mechanism!

Can you use either method to make either ether?!

Williamson Ether

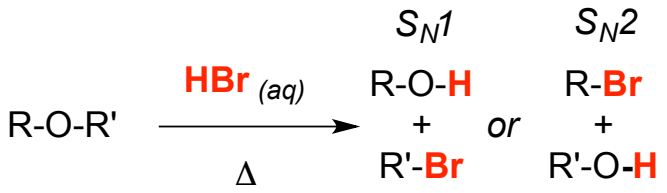
Alkoxymercuration



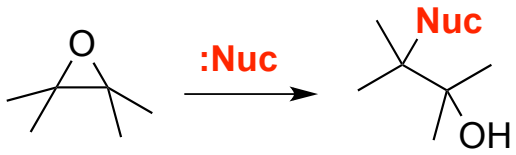


BREAKING C-O BONDS IN ETHERS & EPOXIDES

13.6. Acidic Ether Cleavage

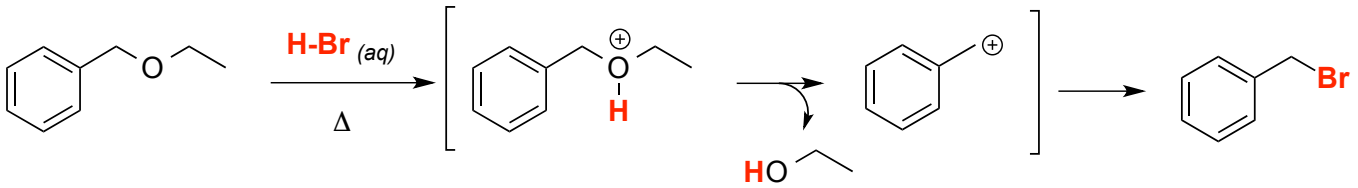


13.10. Epoxide Opening

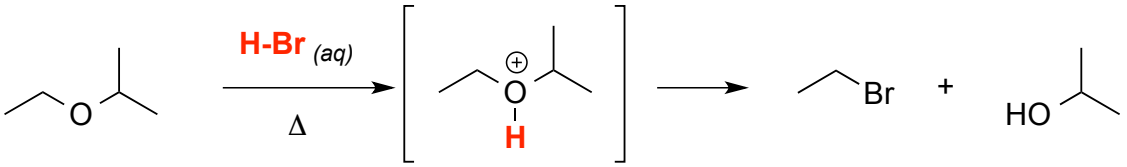


13.6 Acidic Ether Cleavage

S_N1 cleavage if either side of ether is **Benzylic / Tertiary / Allylic**

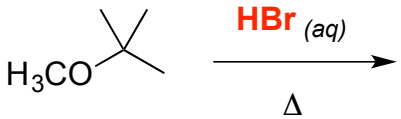


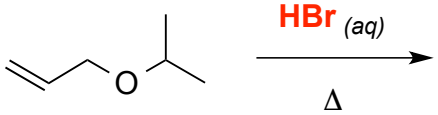
S_N2 cleavage if both sides are **Methyl / Primary / Secondary only**

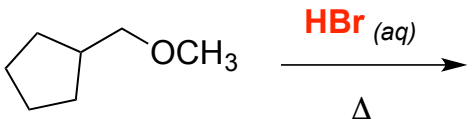


What kind of cleavage occurs? Identify the C on either side of O as…

Benzylic / Tertiary / Allylic (S_N1) or **Methyl / Primary / Secondary (S_N2)**

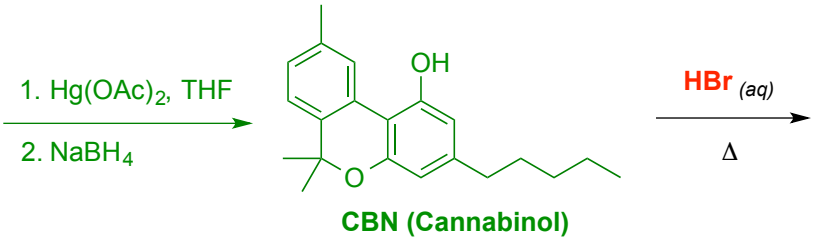






<u>Ether in Nature</u>

Intramolecular Reaction



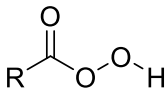
What ethers can't be cleaved and why?

13.8 Preparation of Epoxides

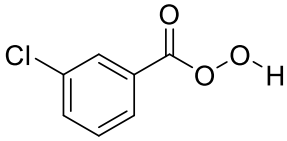
Epoxide = 3-membered ring of 2C's & 1O

Preparation with Peroxy Acids

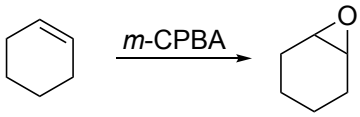
RCO_3H
peroxyacid



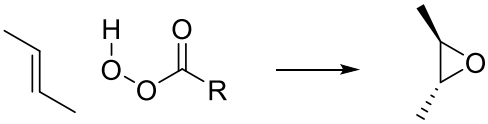
***m*-CPBA**
meta-chloroperoxybenzoic acid



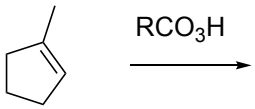
Recall from Chapter 8...

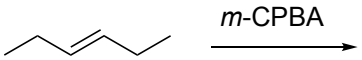


Mechanism (visualization)

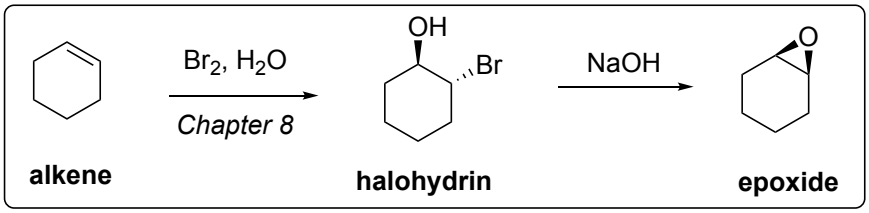


Examples – draw the product

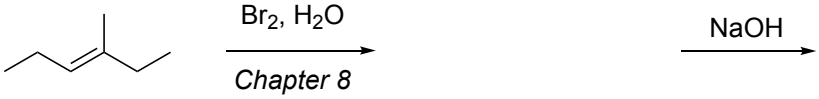


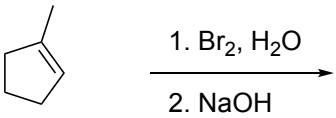


Preparation with Halohydrins



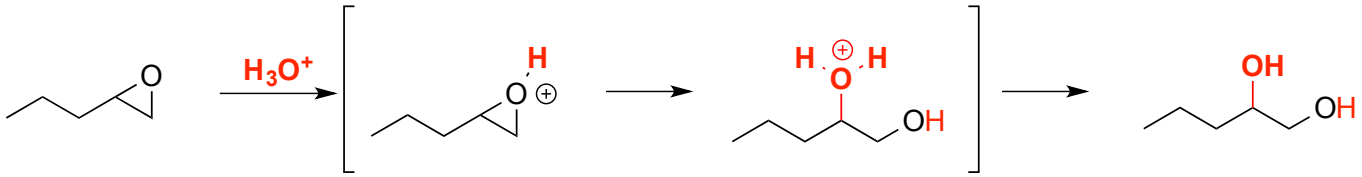
Examples – draw the product

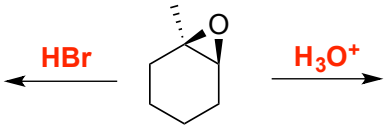




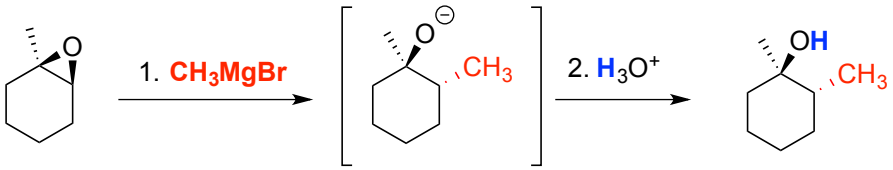
13.10 Epoxide Opening: Acidic vs. Basic Conditions

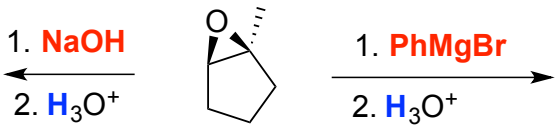
Acidic Opening (H_3O^+ or HX) – nucleophile attacks more substituted C





Basic Opening (HO^-, RO^-, or RMgBr, Grignards) – nucleophile attacks less substituted C





Chapter 13 Reaction Puzzle