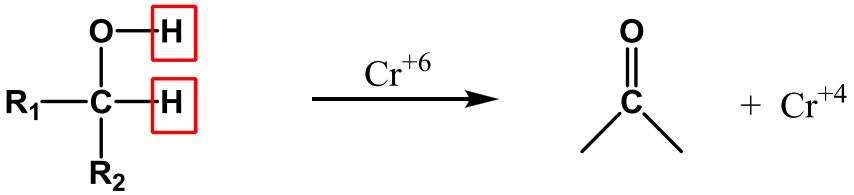
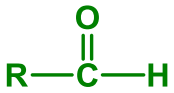
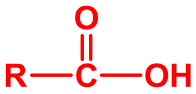
Overheads: - Outline

Recap Monday: Oxidation of Alcohols:



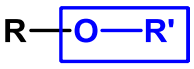
2° Alcohol ⟶ ketone

1° Alcohol (R_1 or R_2 = H) $\xrightarrow[\text{pyridine}]{CrO_3}$ Aldehyde 

$\xrightarrow[H_2O]{CrO_3}$ Carboxylic Acid 

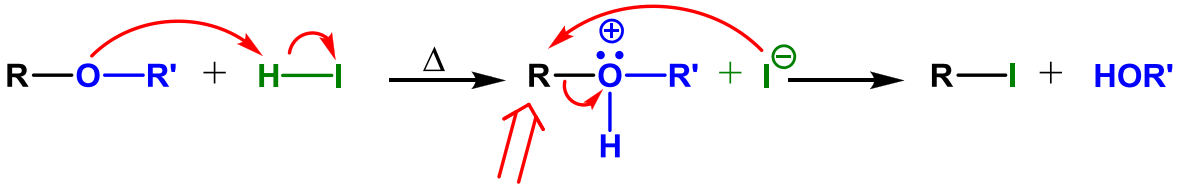
3° Alcohol ⟶ no rxn

Reactions of Ethers



$^{\ominus}OR'$ strong base ∴ not good LG (like OH^-)

⟶ can add H^+ ⟶ HOR' = LG

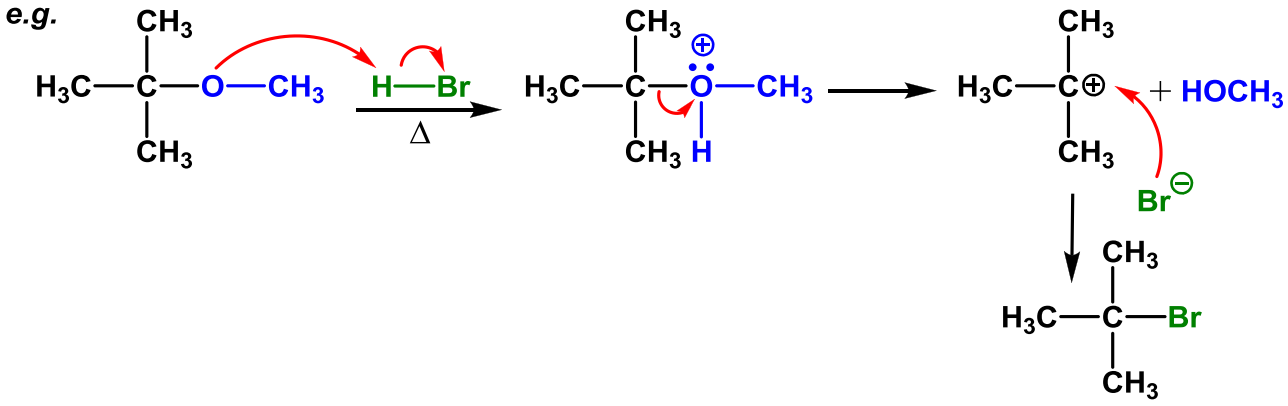


2° / 3° - S_N1 (HI = protic!)

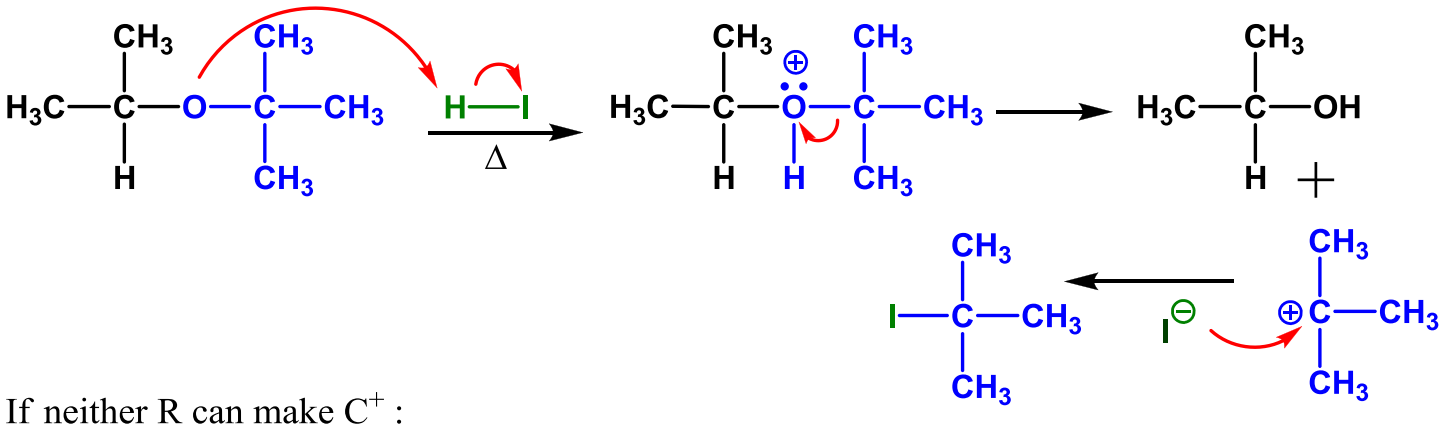
1° - S_N2 ⟶ slower for 1°

→ as long as one R or R' can make C^+, goes S_N1

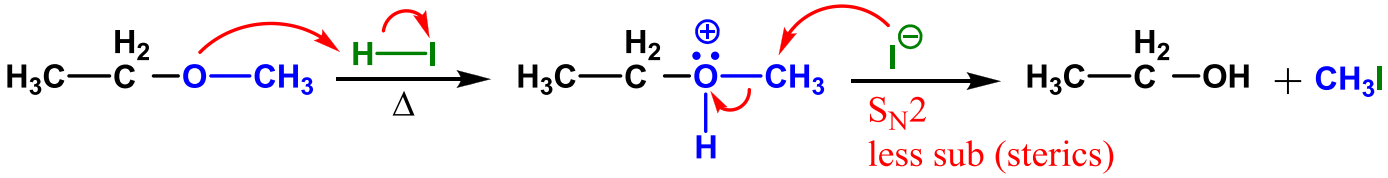
e.g.



If both R's can make C^+ :

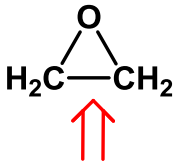


If neither R can make C^+ :

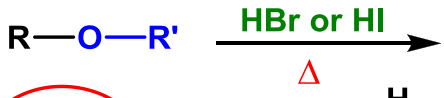


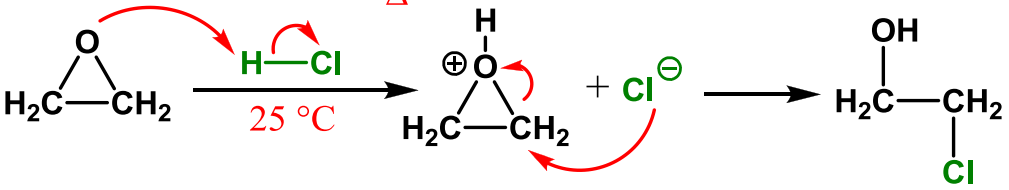
* ethers do not react with HCl → Cl^- not strong enough Nu^- in protic solvents
* only common reaction of ethers!

Epoxides: special cyclic ethers

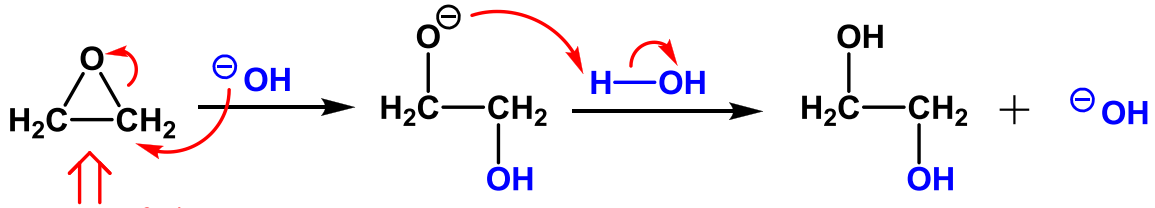
e.g.  = ethylene oxide aka 1,2-epoxyethane (don't worry about naming)

ring strain: much less stable than "normal" ether
less stable = more reactive!

normal ether: 

epoxide: 

⇨ don't even need to protonate O first if Nu^- is strong:



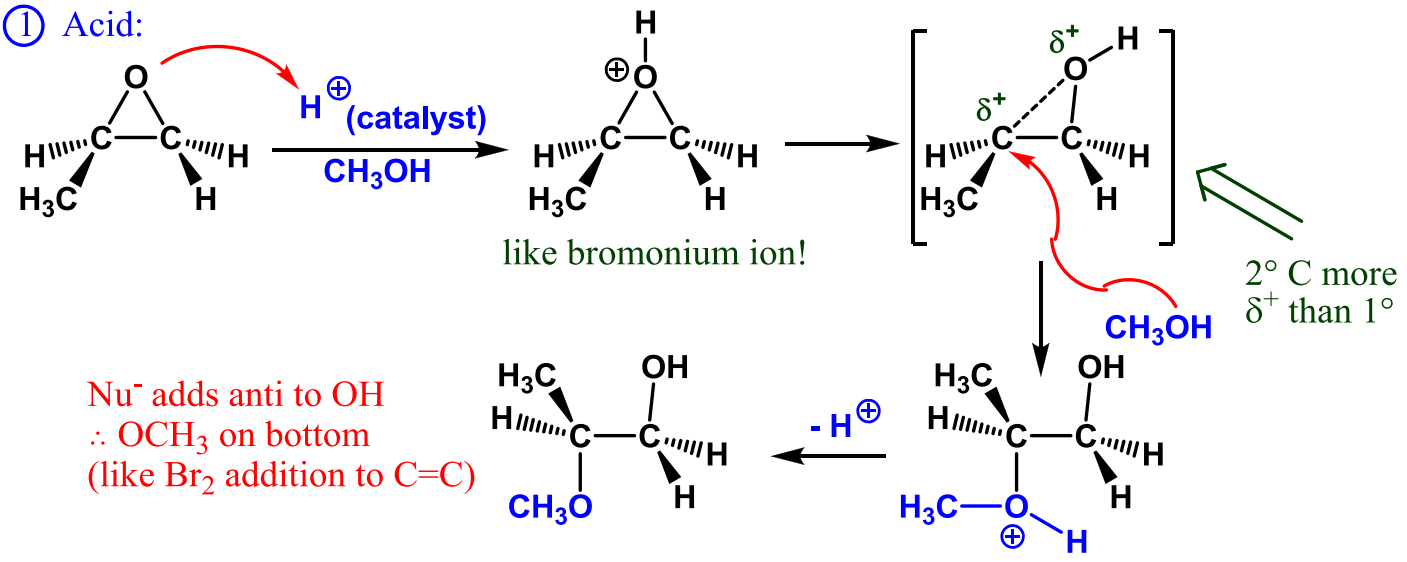
because of ring strain, OR^- is ok LG

ethylene glycol

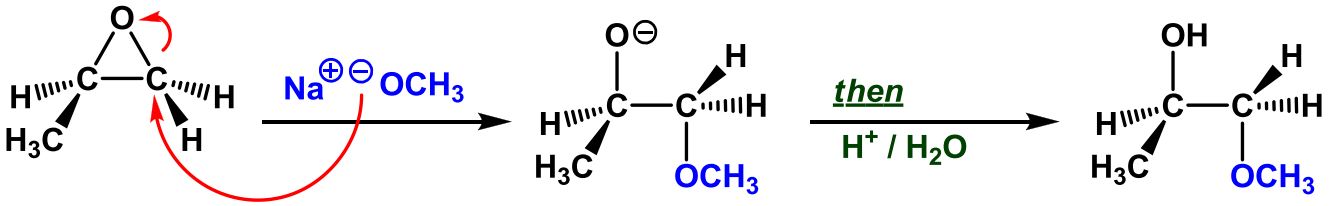
Regiochemistry: - if unsymmetrical, which end does Nu^- add to?

- depends if O is protonated first (acidic conditions) or not (basic)

① Acid:



② Base: O is not protonated, so reaction is simple S_N2



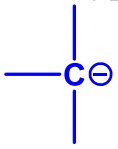
→ In acid, Nu- adds to most sub. end (similar to S_N1)

→ In base, Nu- adds to least sub. end (S_N2)

** In both cases, Nu- adds from bottom (anti to O)

∴ chiral center where Nu- adds gets inverted.

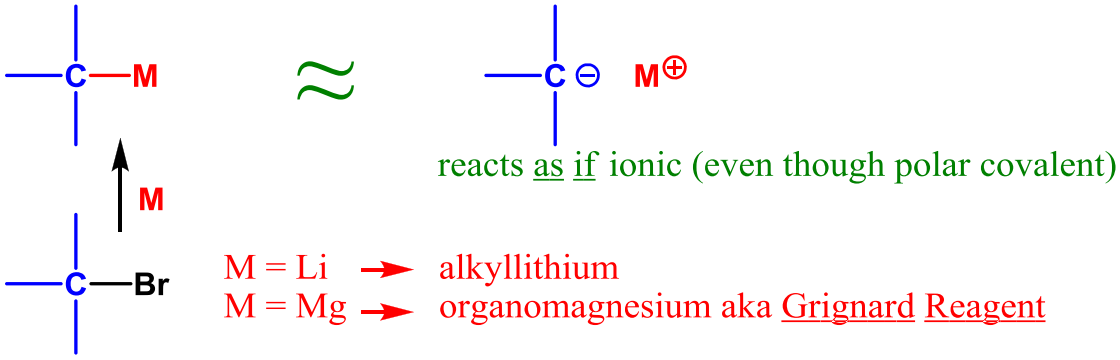
New type of Nu^-:



carbanion (1° > 2° > 3°)

- VERY strong base
- cannot be made by deprotonating CH_4 (pKa = 50!)

Organometallics:



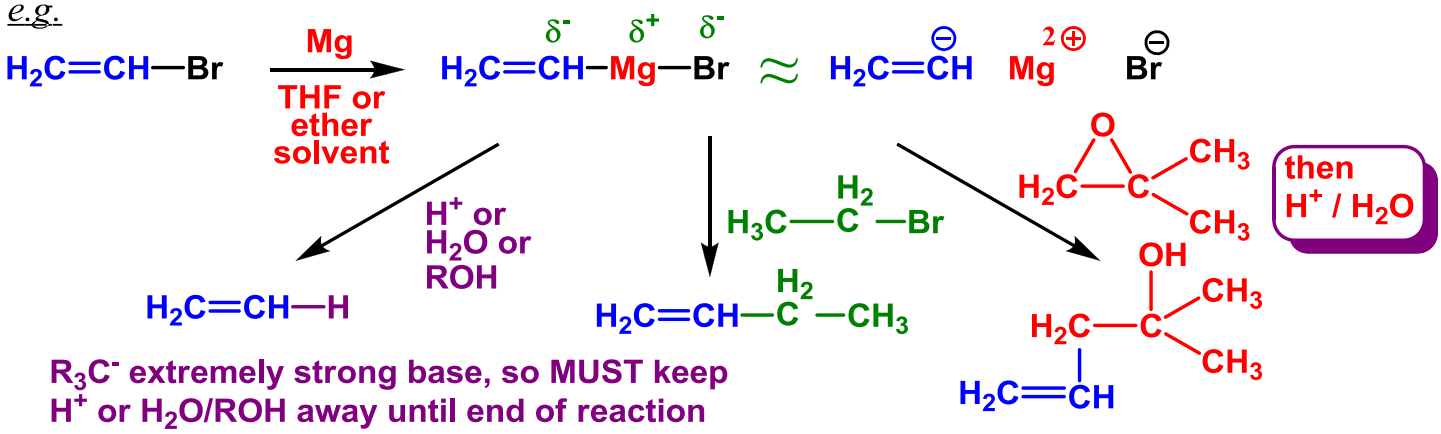
can be alkyl or C=C or benzene ring etc.)

reacts as if ionic (even though polar covalent)

M = Li → alkyllithium

M = Mg → organomagnesium aka Grignard Reagent

e.g.



R_3C^- extremely strong base, so MUST keep H^+ or H_2O/ROH away until end of reaction