Cal Poly Pomona, Organic Chemistry II, CHM 3150, Dr. Laurie S. Starkey
Chapter 13 Summary (Klein-Starkey Text): Ethers & Epoxides

I. Structure & Properties of ethers (13.1, 13.3) *Note: already covered 13.2 Nomenclature of Ethers)*

II. Preparation of ethers (13.5)
- A) Williamson ether synthesis ***SkillBuilder 13.2***
  - i) alkoxide + alkyl halide → ether (RONa + R'X → ROR')
  - ii) planning an ether synthesis (retrosynthesis) to get the best S_N2
- B) Epoxide synthesis (13.8) ***SkillBuilder 13.3***
  - i) MCPBA (RCO_3H) oxidation
  - ii) Halohydrin formation (Br_2/H_2O), followed by deprotonation/"S_N2" (NaOH)
- C) FYI: Alkoxymercuration-demercuration
  - i) Adds -H and -OR with Markovnikov regiochemistry

III. Reactions of ethers
- A) ethers are mostly unreactive, make great solvents
- B) HX ether cleavage (13.6)
- C) epoxide (oxirane) ring-opening (13.9) ***SkillBuilders 13.4, 13.5***
  - i) acid- and base-catalyzed mechanisms
  - ii) regiochemistry and stereochemistry
  - iii) *anti*-dihydroxylation (8.10)
  - iv) reaction with Grignard or hydride reagents

IV. Synthetic strategies: alcohol disconnections (13.10) ***SkillBuilders 13.6, 13.7***
- A) Nu: + epoxide → 2 adjacent functional groups
- B) Grignard + ketone/aldehyde → alcohol
- C) Grignard + epoxide → alcohol

V. FYI: Thiols (R–SH) and sulfides/thioethers (R–S–R') (13.11)
- A) Thiols can be oxidized
- B) Thiols are more acidic than alcohols
- C) RS^- vs. RO^-
  - i) larger anion is more stable, weaker base
  - ii) larger anion is more polarizable, better Nu:

Skip sections: 13.4, 13.7, 13.12