

Cal Poly Pomona, Organic Chemistry II, CHM 3150, Dr. Laurie S. Starkey

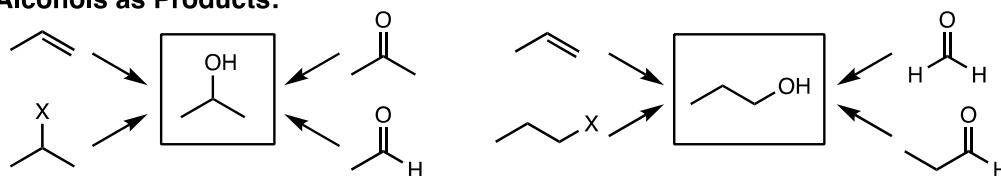
Chapter 12 Summary (Klein Text): Alcohols & Phenols

- I. Nomenclature of alcohols and ethers (12.1, 13.2)
- II. Physical Properties of alcohols and ethers (b.p., H₂O solubility, 12.1, 13.3)
- III. Acidity of alcohols & phenols, and preparation of alkoxides (RO⁻) (12.2)
- IV. Preparation of alcohols: review (12.3)
 - A) S_N2 w/OH⁻ on unhindered alkyl halides (E2 competes w/2°, 3° substrates)
 - B) S_N1 w/H₂O on 3° or allylic alkyl halides
 - C) hydration or dihydroxylation of alkenes (Ch. 8, 12.3, 12.5)
- V. Preparation of alcohols from ketones/aldehydes
 - A) organometallic reagents: Grignard (RMgX) and organolithium (RLi) (12.6)
 - i) prepared from alkyl halide (treat RX with Mg or Li metal)
 - ii) can be protonated by ROH or H₂O
 - iii) Nu: that will react with carbonyl or epoxide E⁺, NOT RX
 - B) hydride Nu: H⁻ (LiAlH₄ or NaBH₄, 12.4)
 - i) a reduction reaction that gives an alcohol product
- VI. Reactions of alcohols
 - A) Oxidation reactions (↑ # of C–O bonds, 12.10)
 - i) oxidizing agents [ox]
 - a) Na₂Cr₂O₇/H₂SO₄ (chromic acid)
 - b) pyridinium chlorochromate (PCC)
 - c) Dess-Martin periodinane (DMP)
 - d) DMSO, oxalyl chloride, Et₃N (Swern)
 - ii) Summary for primary, secondary, tertiary alcohols (1°, 2°, 3° ROH)
 - B) Tosylation of alcohols (TsCl, pyridine) makes a good LG (7.12)
 - C) Elimination reactions (ROH → alkene, 12.9)
 - i) via E2 elimination
 - a) TsCl/py, followed by strong base
 - b) t-BuOK for Hofmann (less substituted alkene)
 - c) NaOH or any alkoxide other than t-BuOK (RONa) for Zaitsev
 - ii) via dehydration (E1 mechanism)
 - a) carbocation intermediate can rearrange
 - b) always give most stable alkene (Zaitsev)
 - D) Conversion to alkyl halides (ROH → RX, 12.9)
 - i) S_N1/S_N2 with HX
 - ii) SOCl₂, PBr₃ or P/I₂

Skip Sections:
12.7, 12.8,
12.11, 12.12

- VII. Synthesis Strategies
 - A) ROH can be prepared from RX, alkene, or ketone/aldehyde
 - B) ROH can be used to prepare RO⁻ (alkoxide), RX, ROTs (tosylate), alkene, or ketone/aldehyde.

Alcohols as Products:



Alcohols as Starting Materials:

