

CHEM 222 section 01

LECTURE #02

Thurs., Sept.06, 2007

Lecture topics & readings

Today's class

- review preparation & properties of alcohols
- start reactions of alcohols

Before next class

- remember labs next week...
- review Chem 221 concepts & reactions
- read ROH material: 10.1 - 10.4 (+ other references in notes)

Next class

- finish ROH rxns: 10.5, 19.2
- start ethers, *etc*: rest of Ch.10

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Ch.10: Rxns of alcohols, amines, ethers, epoxides, sulfur-containing compounds & organometallics

Chapter Goals & hints

Understand rxns involving common heteroatomic functional groups.

- Use mechanisms to help remember reactions & outcomes.
- Identify similarities and reasons for differences.

Topics Outline:

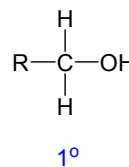
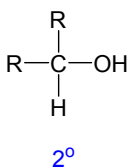
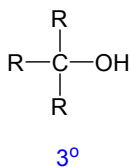
- 10.1-2 Nu S_N rxns of ROH & other ways to form alkyl halides
- 10.3 Converting alcohols into sulfonate esters
- 10.4 Elimination rxns of alcohols: dehydration
- 10.5, 19.2 Oxidation of alcohols
- 10.6 Amines: don't undergo S_N or E rxns...but common bases
- 10.7-8 Nu substitution rxns of ethers & epoxides (prep'n - 4.9)
- [10.9] *Arene oxides (read for interest - not in detail)*
- 10.10 Crown ethers
- 10.11 Thiols, sulfides, and sulfonium salts
- 10.12 Organometallic compounds: RLi, RMgBr, R_2CuLi
- 10.13 Cover only: Gilman reagents, R_2CuLi (organocuprates)

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Review: Preparation and properties of alcohols

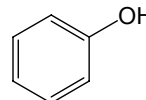
Alcohols:

- OH group bonded to sp^3 C



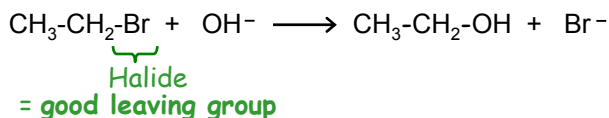
SUBCLASS: Enols

- OH group bonded to sp^2 -hyb. C
- Undergo different reactions
 - cannot do Nu substitution



Preparation of alcohols (except enols):

1) Nucleophilic substitution (Bruice Ch.8)



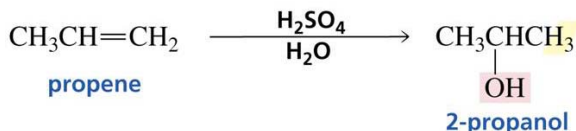
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Mechanism?

- S_N2 : 1°, 2°
- S_N1 : 3°

Review: Preparation of alcohols (continued)

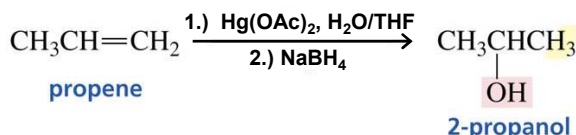
2) Hydration of alkenes (Bruice 4.5)



Markovnikov addition:

- H goes where more H's are
- via carbocation
- rearrangement possible

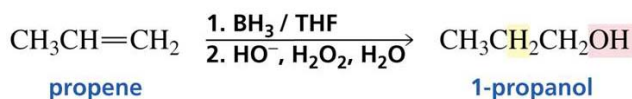
3) Industrial "hydration": Oxymercuration (4.8)



Markovnikov addition

- concerted add'n step
- no rearrangements
- 2nd step removes Hg...

4) Hydroboration of alkenes (4.10)



Anti-Markovnikov addition

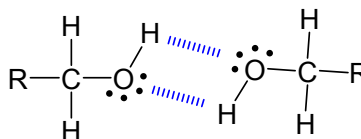
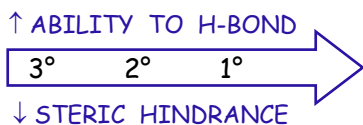
- concerted add'n step
- no rearrangements
- 2nd step removes B...

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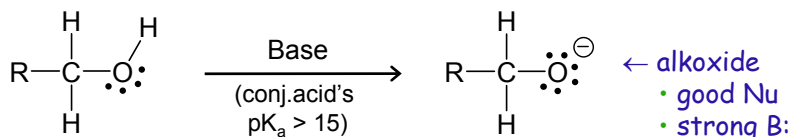
Review: Properties of alcohols

Alcohols:

- Can participate in hydrogen-bonding:



- Relatively easy to deprotonate (in dry organic solvent):



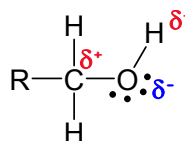
- Relatively weak nucleophiles (...except when deprotonated...)

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New: Reactions of alcohols

Reactivity trend:

- Centered around the OH group
- Electrophilic carbon
- OH⁻ is NOT a good leaving group!
 - stronger base ⇨ poorer L.G.



Reactions coming up: (on board - take notes)

Bruice:

- 1) Nucleophilic substitutions (with activated alcohols) 10.1
- 2) Ways to replace OH with a good L.G.:
 - a. Using SOCl₂ 10.2
 - b. Using PBr₃ 10.2
 - c. Sulfonate esters 10.3
- 3) Elimination: Dehydration 10.4
- 4) Oxidation 10.5, 19.2

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