Cornell University

Ethers, Grignards, & Organolithiums

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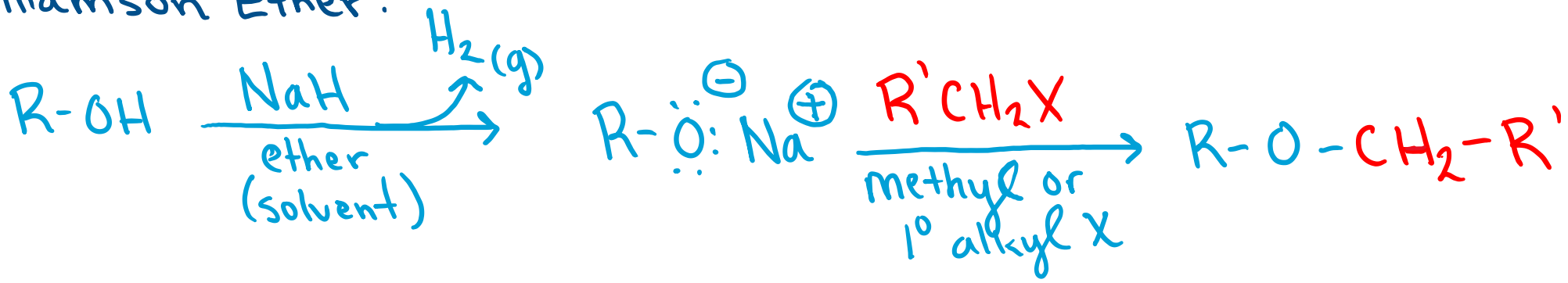
OCSP Lecture #18

Lecture 18 Learning Objectives

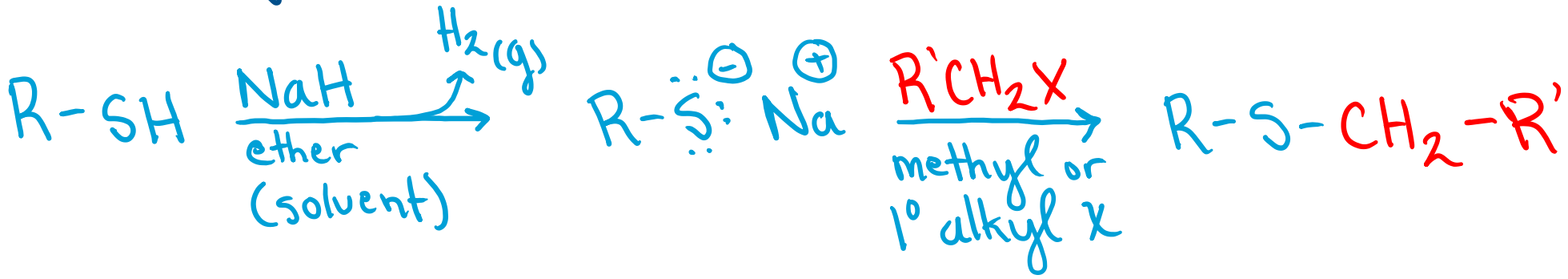
- Ether Synthesis
  - Williamson Ether Synthesis
  - Alkene Alkoxymercuration Reduction
- Hydrocarbon Synthesis
  - Grignard Reagents
  - Organolithium Reagents
  - Reactions with Epoxides

Ether Synthesis: Williamson Ether Synthesis

- General:
  - Williamson Ether:



  - Thioether Synthesis:



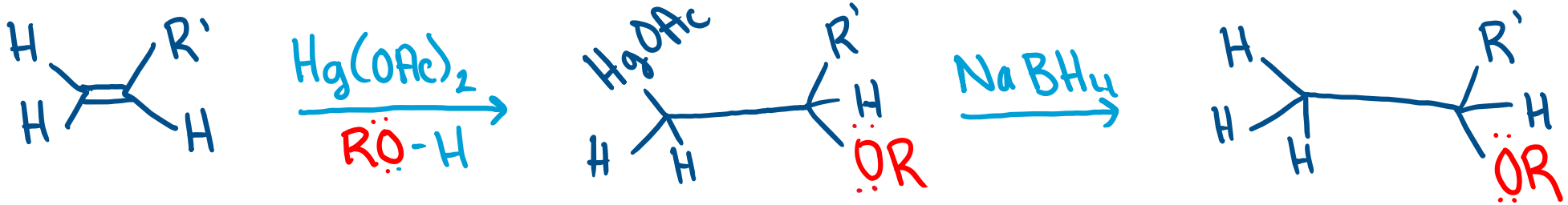
Mechanism of Williamson Ether Synthesis

Williamson Ether Reaction Selectivity

Ether Synthesis: Alkoxymercuration Reduction

Mechanism of Alkoxymercuration Reduction

- General Reaction:



Practice Problems

Quick Note – Reaction Reversibility

- Reactions reversible in strong acids with heat (for ethers containing only primary alkyl groups):

- Reactions reversible in strong but more dilute acid and lower heat (if it contains tertiary alkyl groups):

The Road so Far...

- Ether Synthesis
  - Williamson Ether Synthesis
  - Alkene Alkoxymercuration Reduction
- Hydrocarbon Synthesis
  - Grignard Reagents
  - Organolithium Reagents
  - Reactions with Epoxides

Grignard Reagents

A Grignard reagent is a compound of the form R – Mg – X

Formation of Grignard Reagents

Organolithium Reagents

Quick Note

BOTH Grignard and organolithium reagents are strong bases and potent nucleophiles.

Reactions with Grignard/Organolithium Reagents

Practice Problems

Give the products of the reactions.

(a) $H_3C-Li + CH_3OH \longrightarrow$

(b) $(CH_3)_2CHCH_2-MgCl + H_2O \longrightarrow$

Reactions with Epoxides