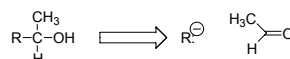
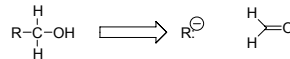
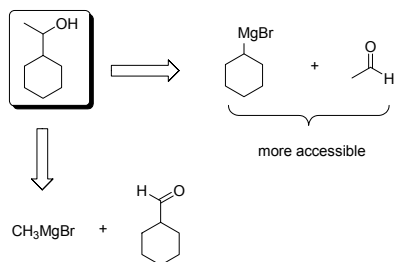


Lecture 10 – Retrosynthesis

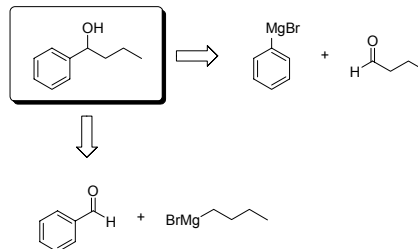
- Retrosynthetic planning in molecule synthesis
- Synthesis of alcohols using Grignard reagents
- Synthesis of alcohols using Organolithium reagents
- Reaction of esters with organometallics
- Coupling of organocuprates
- Simmons-Smith reaction to form cyclopropanes



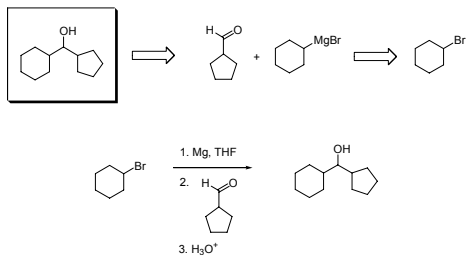
Example:



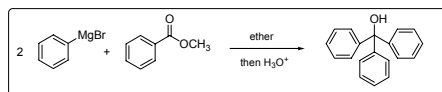
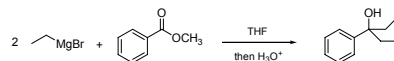
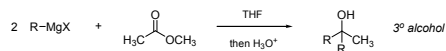
Example:



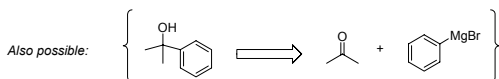
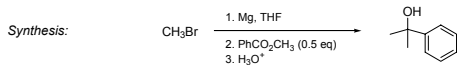
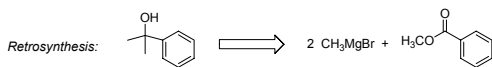
Retrosynthetic Analysis and Synthesis



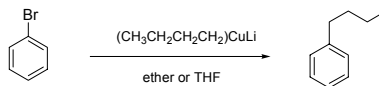
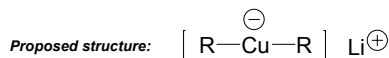
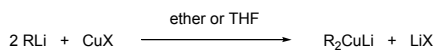
Reactions of Esters with Grignard Reagents



Retrosynthesis and Synthesis using Esters and Grignard Reagents

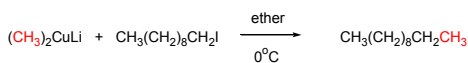


Alkane synthesis using organocopper reagents

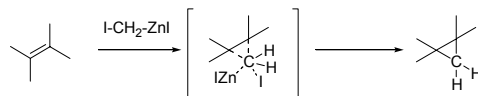
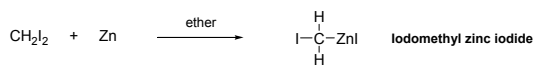


Organocopper reagents:

- Useful for coupling with primary alkyl halides
- Use of secondary and tertiary alkyl halides complicated by competing E2 reactions
- Works for simple alkyl halides, vinyl halides and aryl halides
- **Mechanism not completely understood**

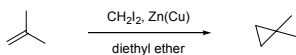
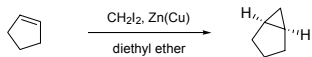
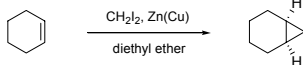


Organozinc reagents in cyclopropane synthesis



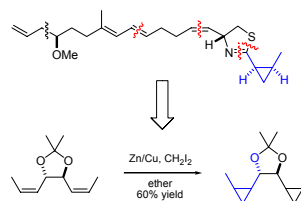
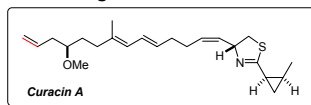
Simmons-Smith reaction

Examples:



CH_2 adds to only one face of the alkene: **Syn addition**

Simmons-Smith reagent in Natural Product synthesis



Iwasaki et. al. *Tetrahedron Lett.* **1996**, 37, 4397-4400