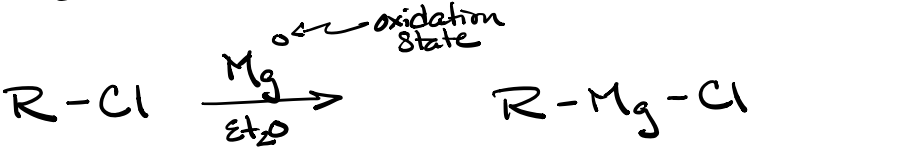
Grignard

organometallic chemistry



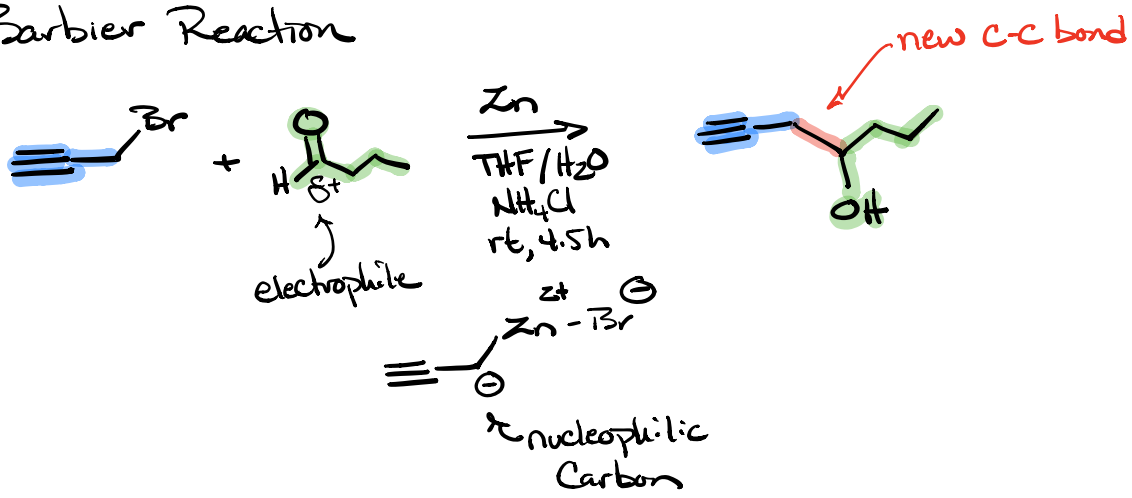
Grignard Reagent

Nucleophilic Carbon used to make new C-C bonds

Umpolung - Reversal in polarity

Philippe Barbier 1848-1922

Barbier Reaction



many metals were used

Zn, In, Sm, Mg, Al, Sn

Main difference with Grignard is that Barbier was "in Situ"

"in Situ" ⇒ in one pot

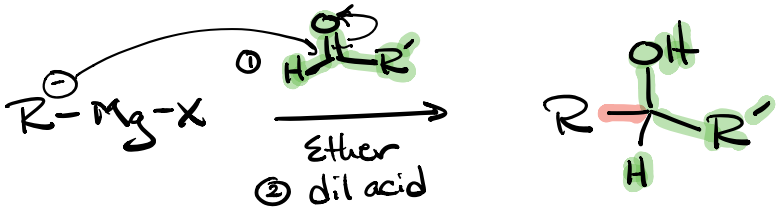
Grignard Rxn is a two Step process.

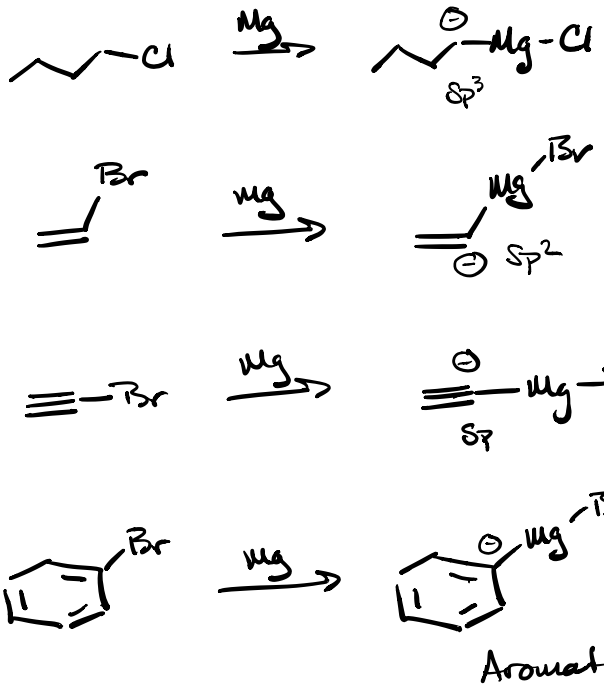
① Make Grignard Reagent

where R = alkyl Sp^3
alkenyl Sp^2
alkynyl Sp
aromatic Sp^2

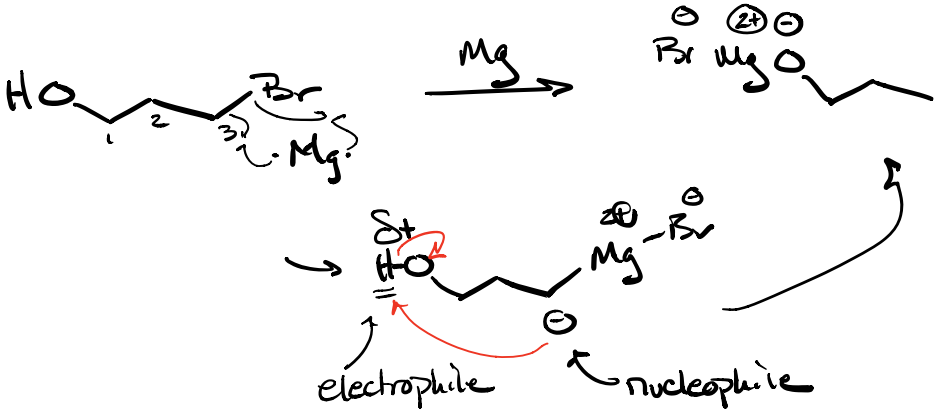
Between Covalent & Ionic

② Add an electrophile





What doesn't work?



	$C^{\ominus}$	$N^{\ominus}$	$O^{\ominus}$	$F^{\ominus}$ Conjugate
	$C-H$	$N-H$	$O-H$	$F-H$
pka	60	45	15.7	1

↑ ↑

	Acid	Conj Base
		 weak base
pka	4.5	
		$^{\ominus}OH$ Strong base
pka	15	
	H_3C-H	$H_3C^{\ominus}$ Crazy strong base
pka	60	

Stronger ↑

weaker base

Stronger base ↓

Grignard Reagents are both strong base & strong nucleophile