Today

Aldehyde and Ketone Nomenclature
Section 16.1

Relative Reactivities
Section 16.2

How Aldehydes and Ketones React
Section 16.3

Reactions with Carbon Nucleophiles
Section 16.4

Next Class

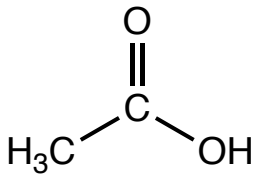
Reductions and Reactions with Hydride
Sections 16.5 - 16.7

Reactions with Nitrogen Nucleophiles
Section 16.8

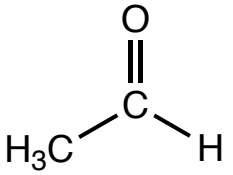
Aldehydes

Name of the acid, drop the "ic" ending and add aldehyde

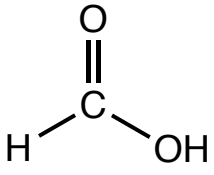
e.g.



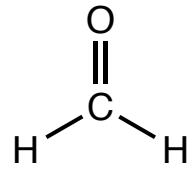
acetic acid



acetaldehyde



formic acid

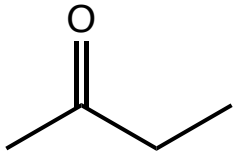


formaldehyde

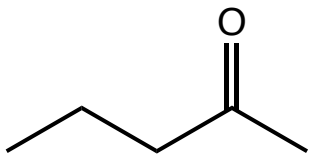
Ketones

Name of the shorter alkyl substituent, name of the longer alkyl substituent and the word ketone

e.g.



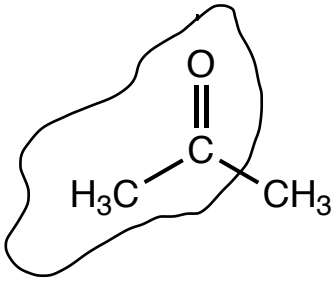
methyl ethyl ketone



methyl propyl ketone

MEK

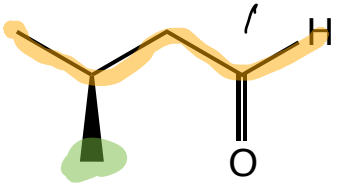
and then there's **acetone**...



it's the ketone with the acetyl group in it.

Aldehydes

#'s-(substituent names)(parent alkane)al



parent alkane is the longest C chain that starts with the aldehyde

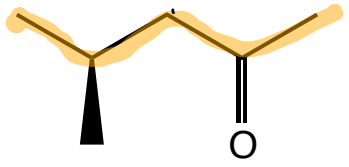
remove the "e" from the parent alkane and add "al" to convert to aldehyde name

name and number substituents as in the past with aldehyde defined as C-1

3-methylbutanal

Ketones

#'s-(substituent names)-#-(parent alkane)one



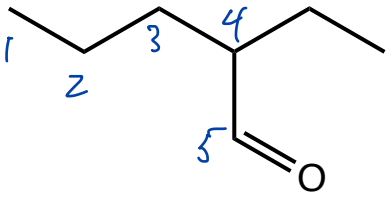
parent alkane is the longest C chain that contains the carbonyl

remove the "e" from the parent alkane and add "one" to convert to the ketone name

number the position of the carbonyl giving it the lowest possible number

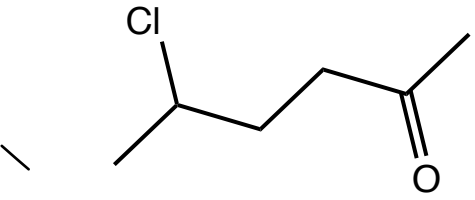
name and number substituents as in the past with the positions determined based on the numbering of the carbonyl

4-methyl-2-pentanone



aldehyde or ketone?

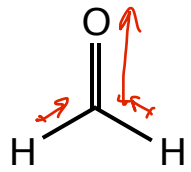
2-ethylpentanal

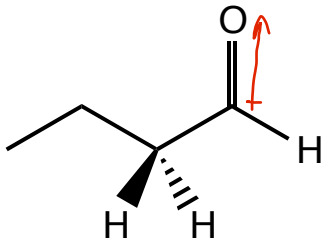


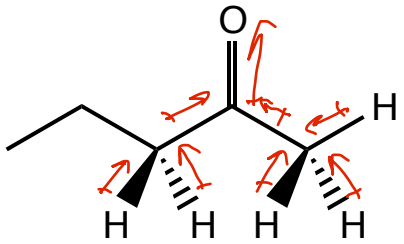
aldehyde or ketone?

5-chloro-2-hexanone

most reactive middle reactive least reactive







only has 2 H atoms to push e⁻ density towards C=O's C

most e⁻ deficient

no organic shrubbery to get in the way

lots of H's to push e⁻ density towards C=O's C

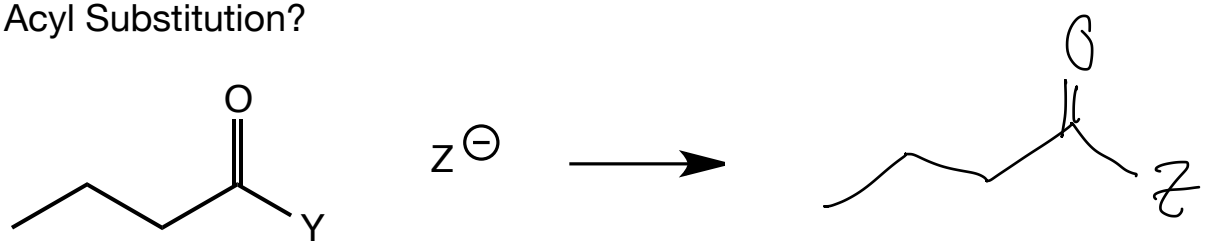
least e⁻ deficient

lots of shrubbery getting in the way

carbonyl C is electrophilic

they react with nucleophiles

Acyl Substitution?

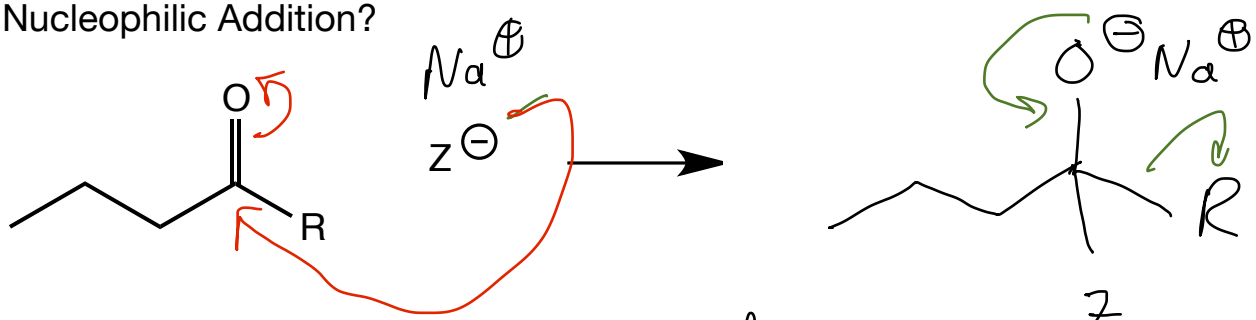


aldehyde Y = H ketone = CR_3

$Y^{\ominus}$ way too basic to be LG

$H^{\ominus}$ $^{\ominus}CR_3$

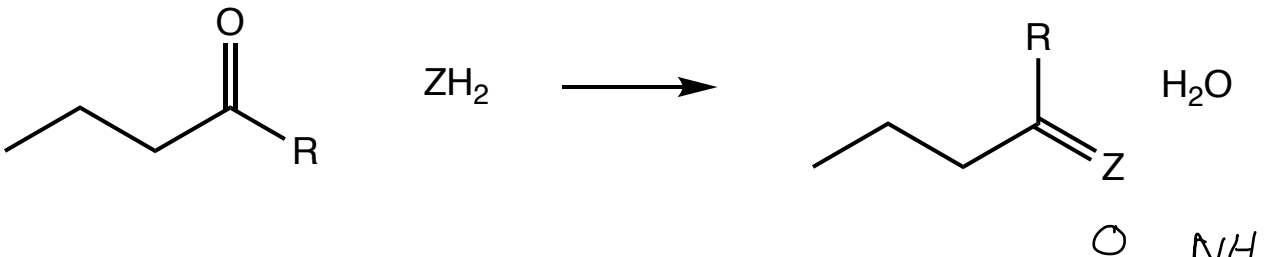
Nucleophilic Addition?



if this decomposed like acyl sub $R^{\ominus}$

Z = C or H based nucleophiles

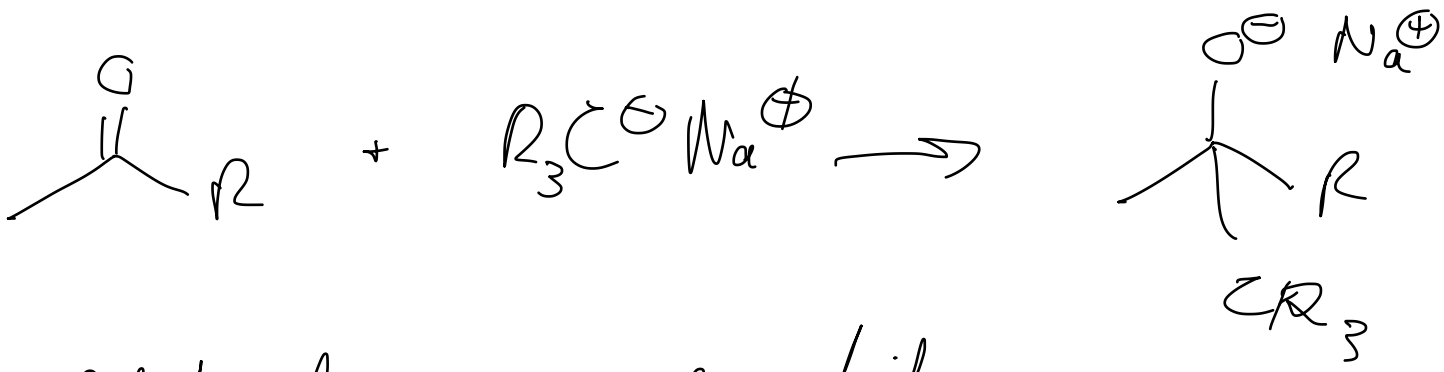
Nucleophilic Addition-Elimination?



if Z = N we have made an imine

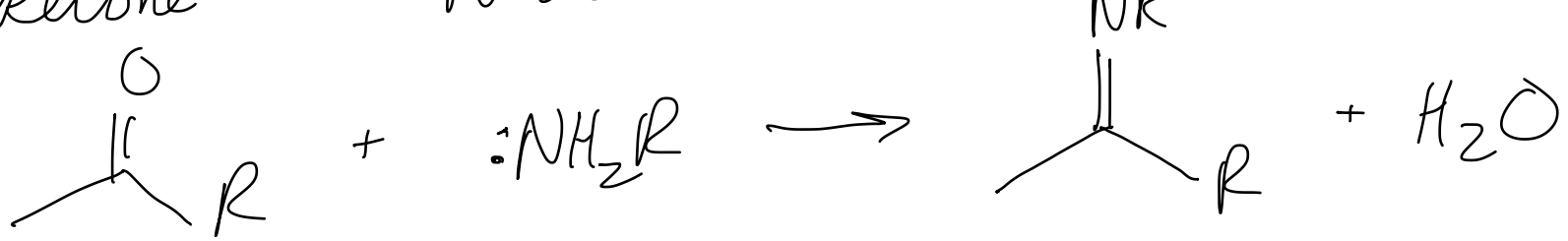
Z = O or NH

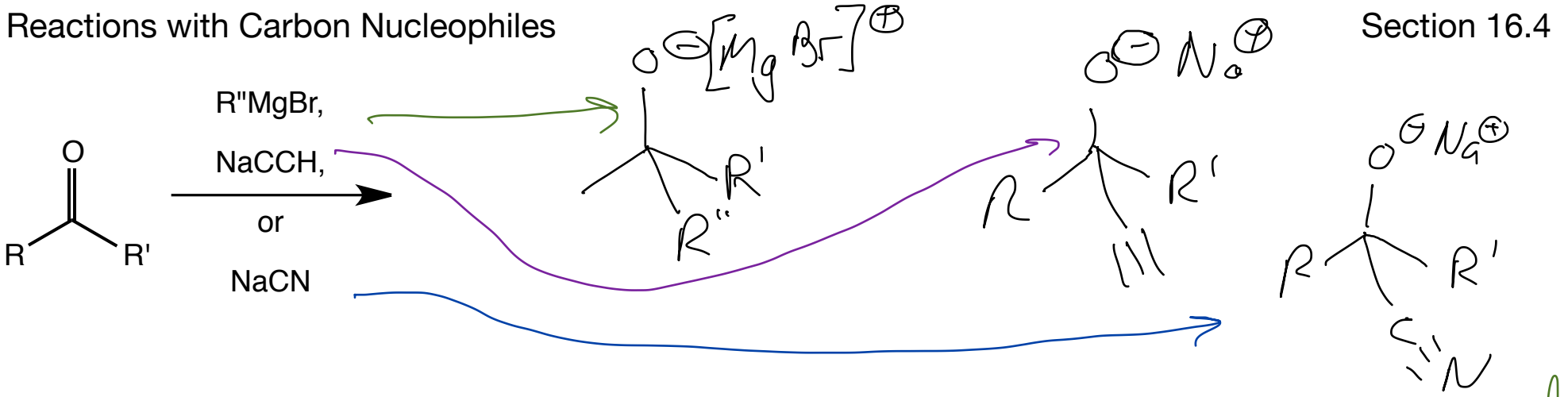
$H-\ddot{\underset{\ominus}{O}}-H$



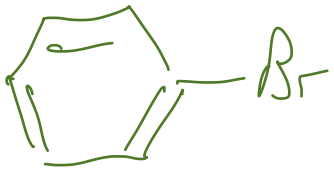
aldehyde or ketone + nucleophilic C atom → react to form an alkoxide... a deprotonated alcohol

aldehyde or ketone + nucleophilic N atom → react to form an imine





$\overset{-1}{CH_3}\overset{+2}{Mg}\overset{-1}{Br} \leftarrow CH_3Br + Mg$



Grignard

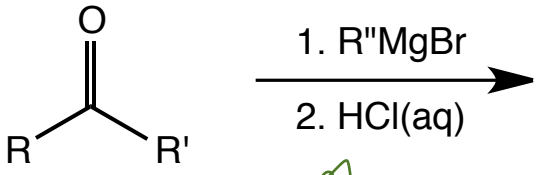
$\overset{+1}{Na}\overset{-1}{C{\equiv}CH} \leftarrow NaNH_2 \quad H-C{\equiv}C-H$

acidic and can be removed by a strong base

$\overset{+1}{Na}\overset{-1}{C{\equiv}N}$

$H-C{\equiv}N$

acidic... add base to remove $H^{\oplus}$



No H_2O

No ROH as solvent

1. is first reaction

2. is second reaction done after the 1st reaction is finished

Why not throw everything in together

$R^{\ominus} MgBr + HCl \rightarrow RH \quad MgBrCl$