CHEM 25600 Final Exam

Final Exam

- Friday, May 7th, 8:00 am – 10:00 mm

Room: LAMB F101 (All students)

Final Review Sessions

- In class – 4/28
- Thursday, 5/6 11:00 am – 12:30 pm, WTHR 172

Final: cumulative for semester

- Exam 1 material
- Exam 2 material | 85%
- Exam 3 material
- Chapters 18(reductions) & 23 – 15%
- Polymers, Proteins, Nucleic Acids – extra credit problems (15 pts)
- 25% multiple choice problems

Grades are posted on the class web site

Final Grade

- Your final grade will be based on 500 total points

- You may drop one of the following:
  1. 1 exam grade
  2. one-half of your final exam grade

- We will automatically drop whichever of the above grade is the lowest when calculating your final grade

-Guaranteed cutoffs and grades:

Point Total	**Grade**
500-450	A
449-400	B
399-350	C
349-300	D
299-0	F

Material Covered for CHEM 256 Cumulative Final Exam - General

1. Nomenclature (all from both semesters)
2. Physical Properties (bp, water solubility)
3. pKa's (Table 4.1) and pKb's (values and trends)
4. Spectroscopy (NMR, IR, MS, UV/Vis) (1 study sheet @)
5. Aromaticity
6. Directing groups in EAS
7. Reactions (see attached handout)
8. Mechanisms (see attached handout)

How to study for the CHEM 256 Final Exam

1. Make study sheets based on above material (1-6)
2. Make flash cards for each reaction (starting materials, reagents, products) and study them. (or use attached handout)
3. Write out the mechanisms until you know them cold. (from attached handout)
4. Go over top 10 lists – supplement study sheets
5. Do review problems (in this handout) from Brown and Foote.
6. Go through old exams (use as practice – look at answers later)
7. If you still have time, solve more of the problems that were assigned for each chapter in Brown and Foote.

Good Review Problems for CHEM 256 Final Exam
(4th & 5th Editions)

Chapter 12 - IR
6*, 7*, 11 (*assign peaks) (both Eds)

Chapter 13 - NMR
10, 16, 26 (4th Ed)
9, 15, 24 (5th Ed)

Chapter 14 – Mass Spec
15, 16, 22, 25, 29*, 30* (*assign peaks) (both Eds)

See additional mixed spectral problem handout

Chapter 16
14, 15, 19, 30, 32, 39, 43, 46, 51 (both Eds)

Chapter 17
7, 8, 15, 19, 26, 32, 37 (both Eds)

Chapter 18
12 (not d,k,l), 13 (not b,f), 16, 19, 20, 31, 41, 49 (both Eds)

Chapter 19
17, 18, 30, 31, 45, 52 (4th Ed)
18, 19, 31, 32, 46, 56 (5th Ed)

Chapter 22
7, 14, 15, 19, 20 (both Eds)

Chapters 21 & 23
assigned problems including benzene nomenclature in 21 (note: problems 21.40, 21.50, 23.34 and 23.44 are good synthesis reviews)

How to convert one functional group into another – Chemistry 256

alcohol
- ketone/aldehyde (reduction) H_2/ Pt, $NaBH_4$, LAH
- carboxylic acid (reduction), LAH
- ester (reduction), LAH
- ketone/aldehyde + carbon nucl.
- ester + 2 carbon nucl.

carboxylic acid
- aldehyde (oxidation) H_2CrO_4, Ag_2O
- acid chloride + H_2O
- anhydride + H_2O
- ester + H^+/H_2O or HO^-
- amide + H^+/H_2O or HO^-
- nitriles + H^+/H_2O or HO^-
- RMgBr + CO_2

ester
- ketone + peroxyacid
- carboxylic acid + H^+/ROH
- carboxylic acid + CH_2N_2
- acid chloride + ROH
- anhydride + ROH
- other esters + H^+/ROH
- simpler ester (via enolate and RCl)

ketone
- acid chloride + R_2CuLi
- β-ketoacid (decarboxylation)
- simpler ketone (via enamine and RCl)
- simpler α,β-unsaturated ketone + nucl.(1,4-add)

aldehyde
- ester + DIBAL
  - simpler aldehyde (via enamine and RCl)
- simpler α,β-unsaturated aldehyde+nucl. (1,4-add)

alkene
- ketone/aldehyde + Wittig reagent
- β-hydroxyket./ald. + H^+ or HO^-

alkane
- aldehyde/ketone Zn/Hg, HCl or N_2H_4, NaOH
- alkene +H_2, Pd

acetal/ketal
- aldehyde/ketone HCl, ROH

imine
- aldehyde/ketone amine, HCl

oxime
- aldehyde/ketone hydoxylamine, HCl

hydrazone
- aldehyde/ketone hydrazine, HCl

acid chloride
- carboxylic acid + $SOCl_2$

amide
- acid chloride + amine
- anhydride + amine

amine
- amide (reduction) LAH
- nitrile (reduction) LAH
- simpler amines + RX
- nitro + Fe/HCl, NaOH
- imine + H_2/Ni

α-bromoketone
- ketone +Br_2 (acidic and basic)

β-hydroxyketone/aldehyde
- ketone/aldehyde (acidic and basic conditions)

β-ketoester
- 2 esters + base
- simpler β-ketoester base + RCl

phenyl ether
- phenol + NaOH + RCl

quinone
- phenol + H_2CrO_4

chlorobenzene
- benzene + $Cl_2/FeCl_3$

nitrobenzene
- benzene + HNO_3/H_2SO_4

benzenesulfonic acid
- benzene + SO_3/H_2SO_4

alkylbenzene
- benzene + $RCl/AlCl_3$

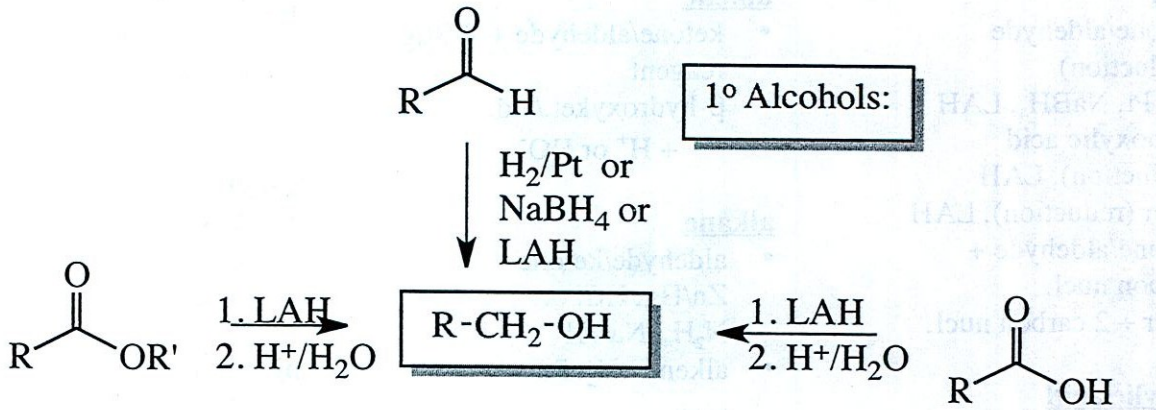
ketobenzene
- benzene + $RCOCl/AlCl_3$

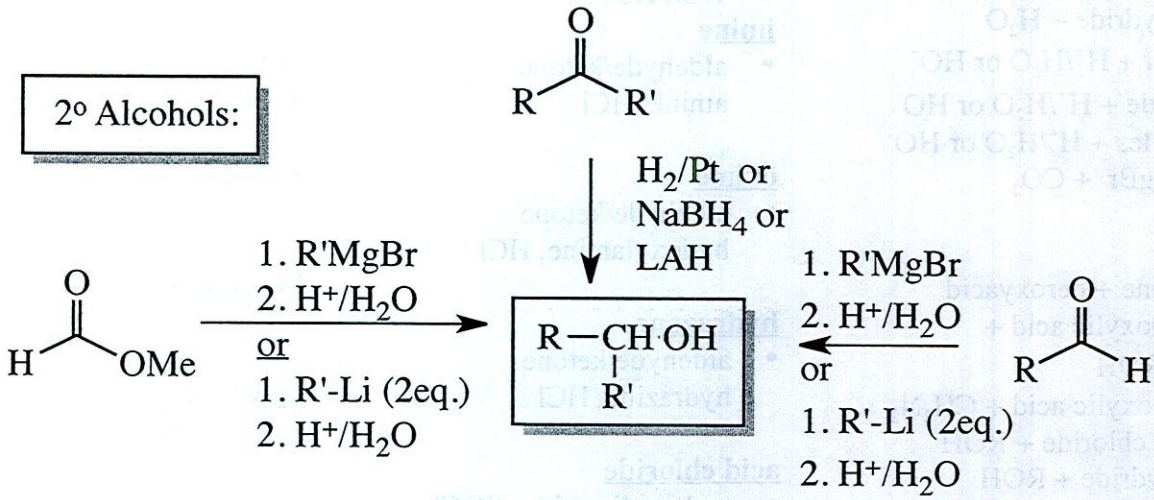
phenol
- chlorobenzene + NaOH

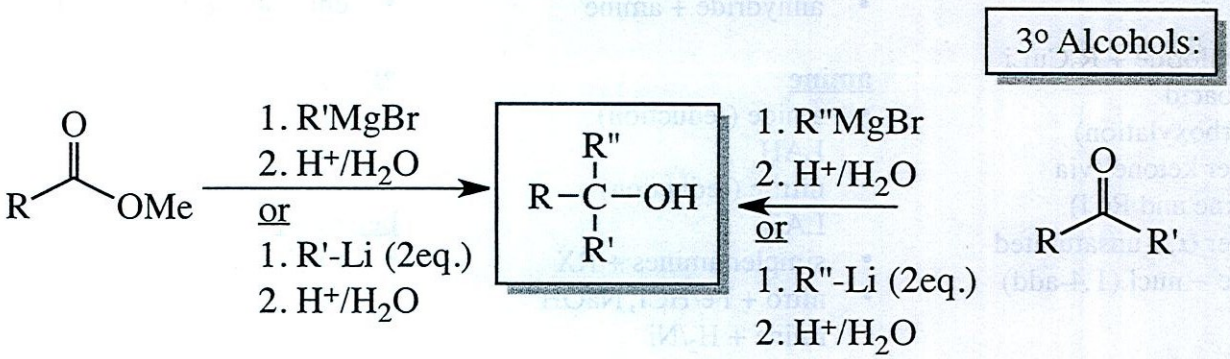
aniline
- chlorobenzene + $NaNH_2/NH_3$

benzoic acid
- alkylbenzene (oxidation) H_2CrO_4

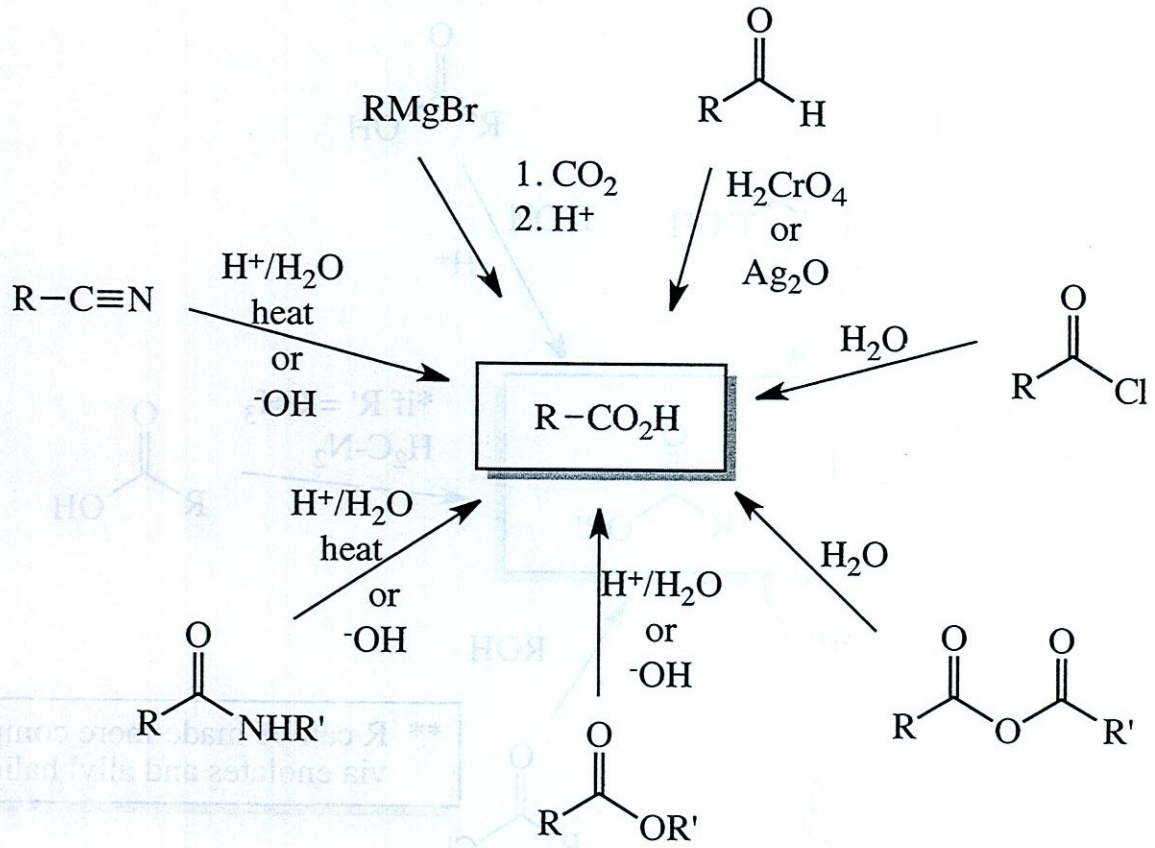
Formation of Alcohols



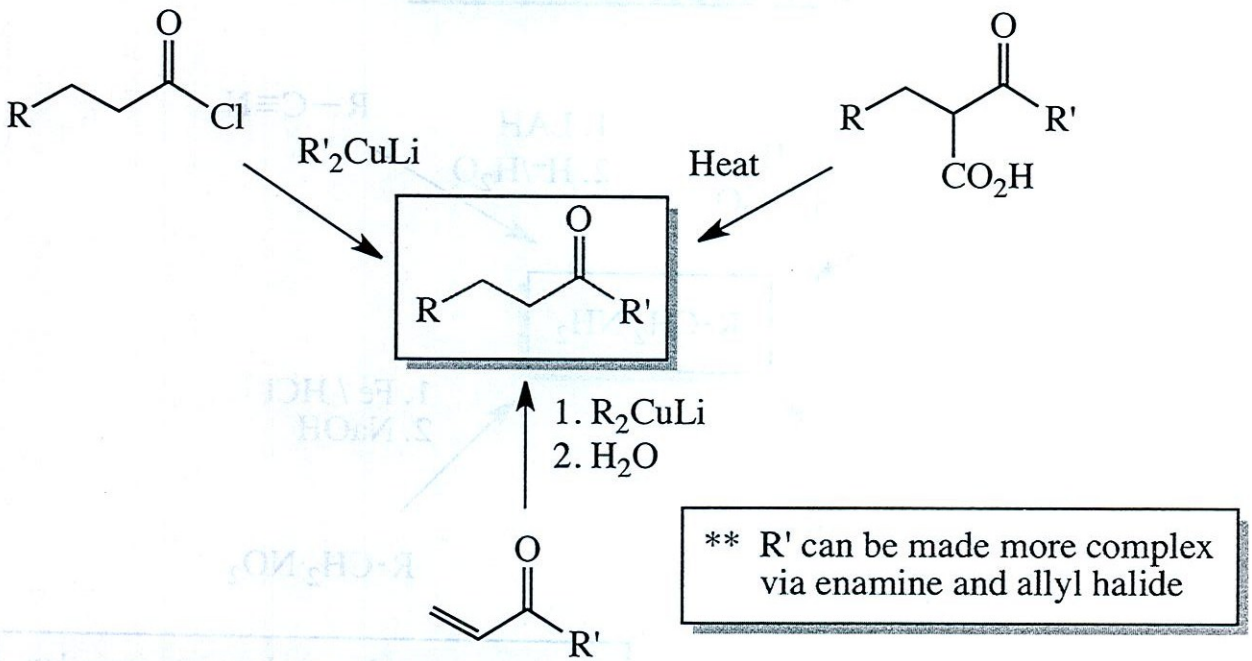




Formation of Carboxylic Acids

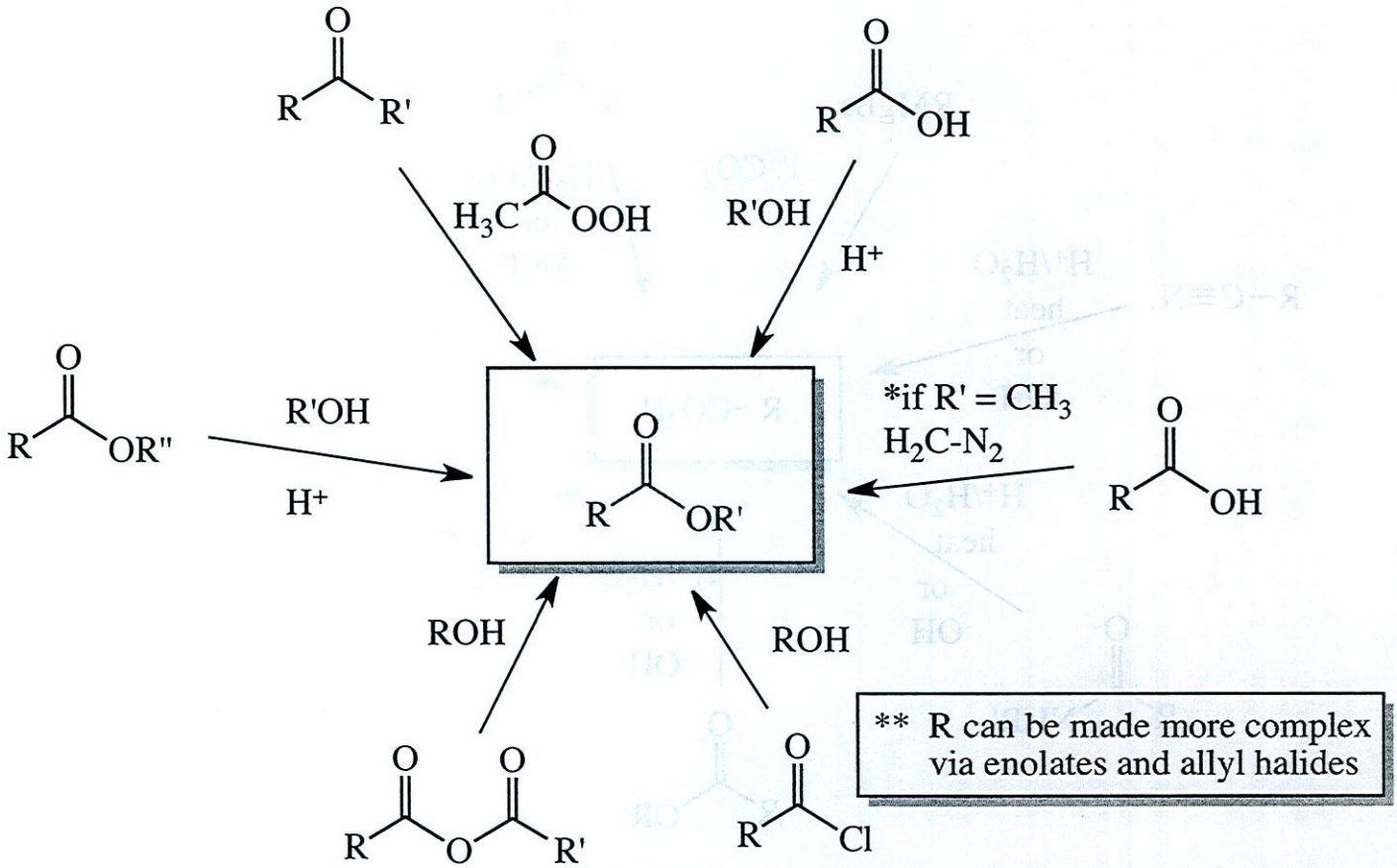


Formation of Ketones

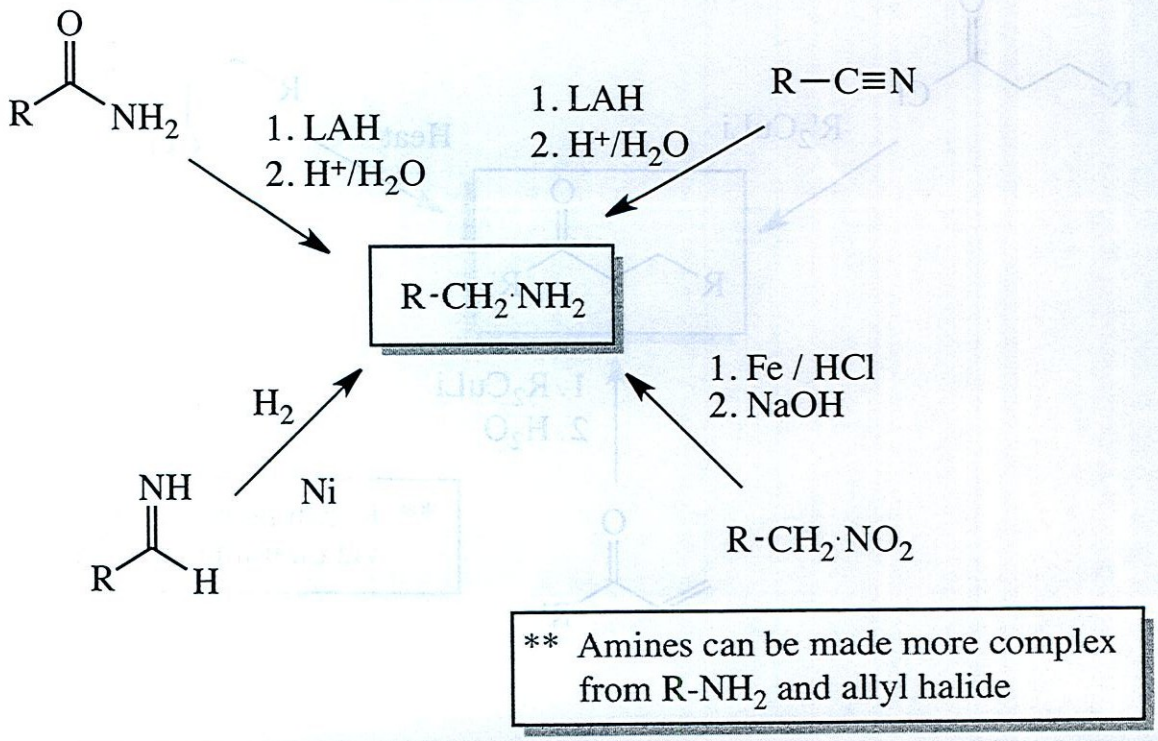


** R' can be made more complex via enamine and allyl halide

Formation of Esters

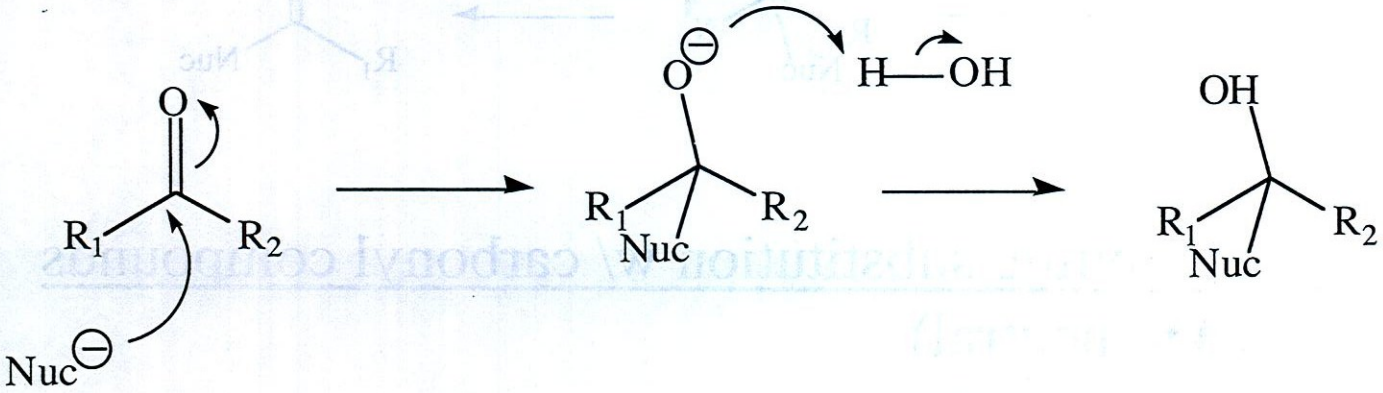


Formation of Amines

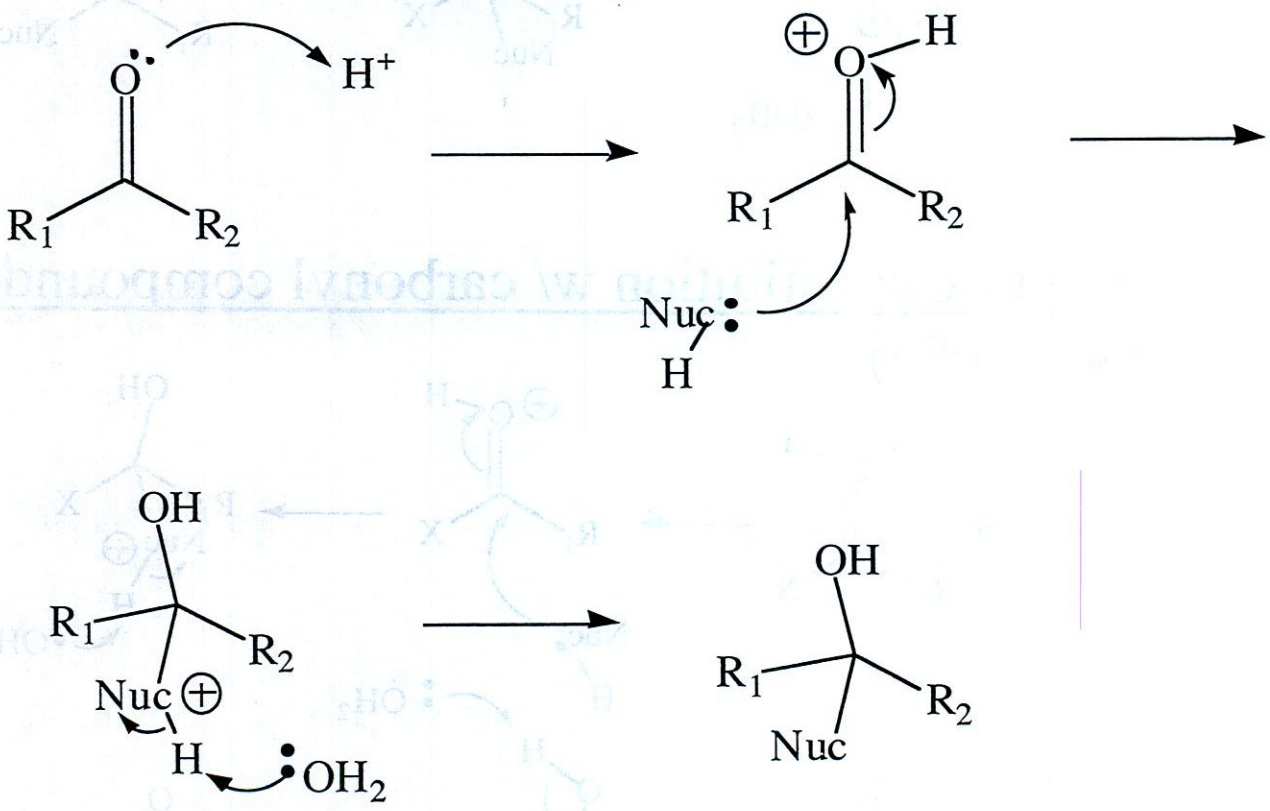


Major Reaction Mechanisms of Chemistry 256

1a. Nucleophilic addition to carbonyls - **NAA** (basic)



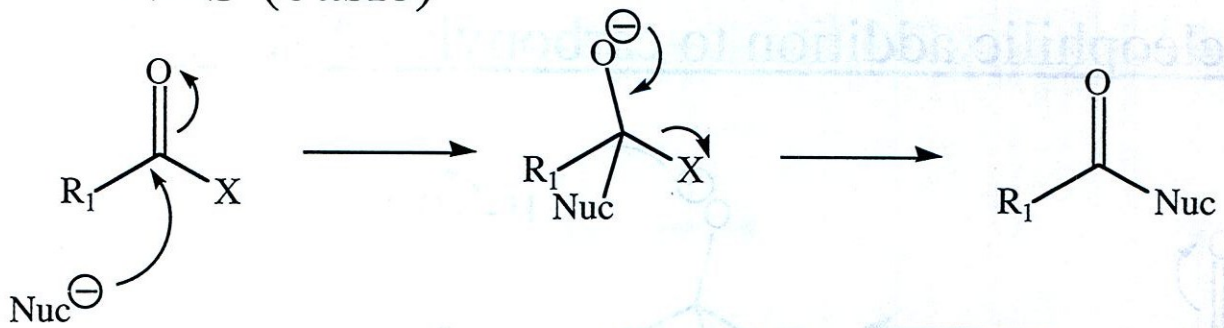
1b. Nucleophilic addition to carbonyls - **NAA** (acidic)



Also a neutral mechanism - same as acidic but don't protonate carbonyl

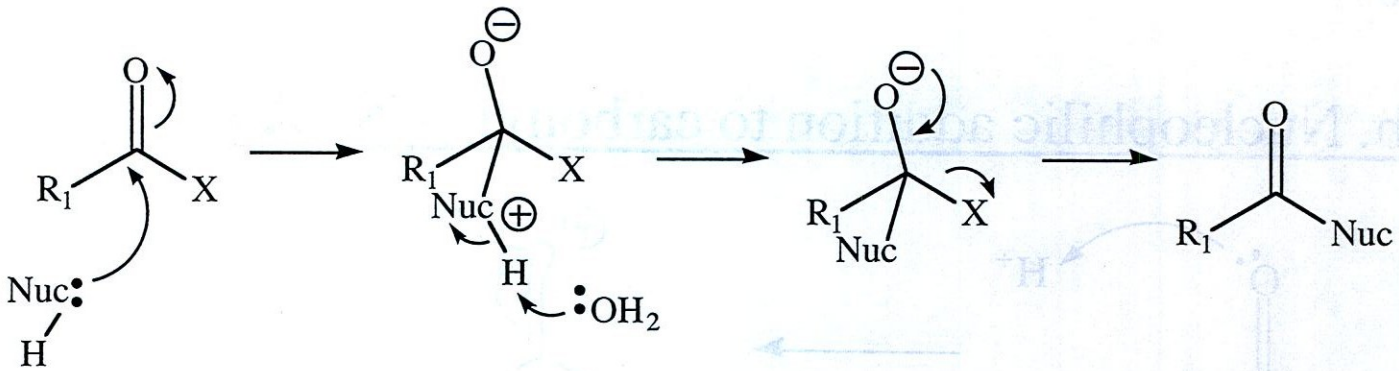
2a. Nucleophilic substitution w/ carbonyl compounds

NAS (basic)



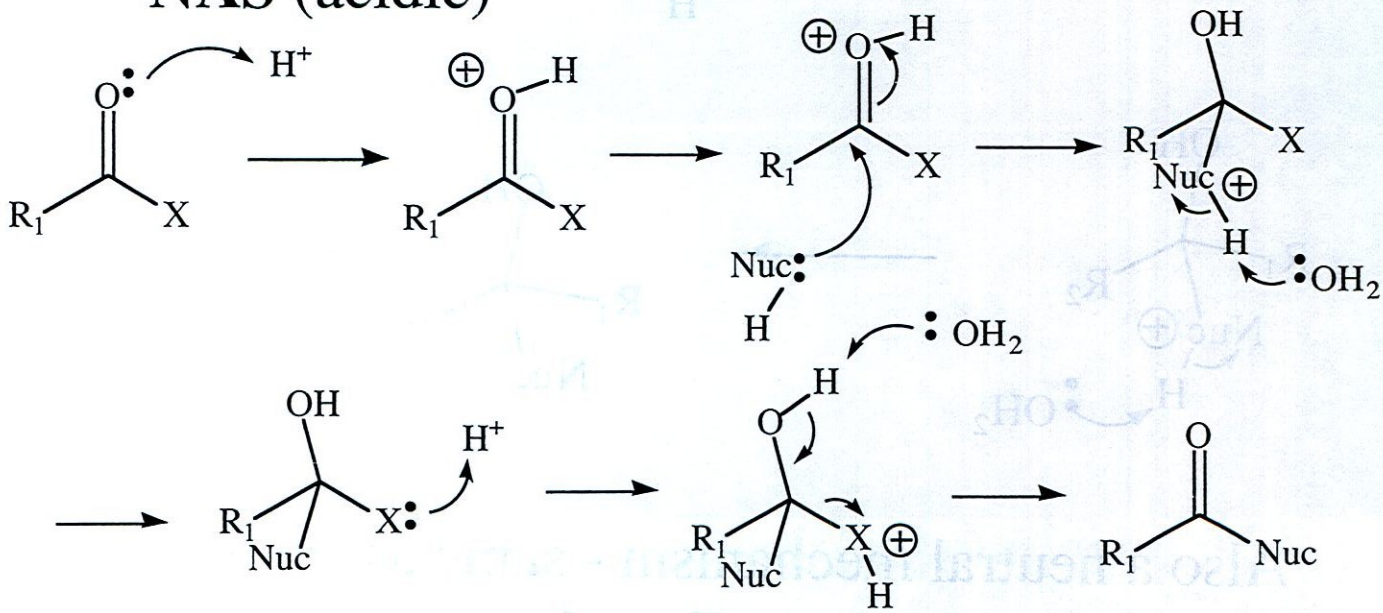
2b. Nucleophilic substitution w/ carbonyl compounds

NAS (neutral)

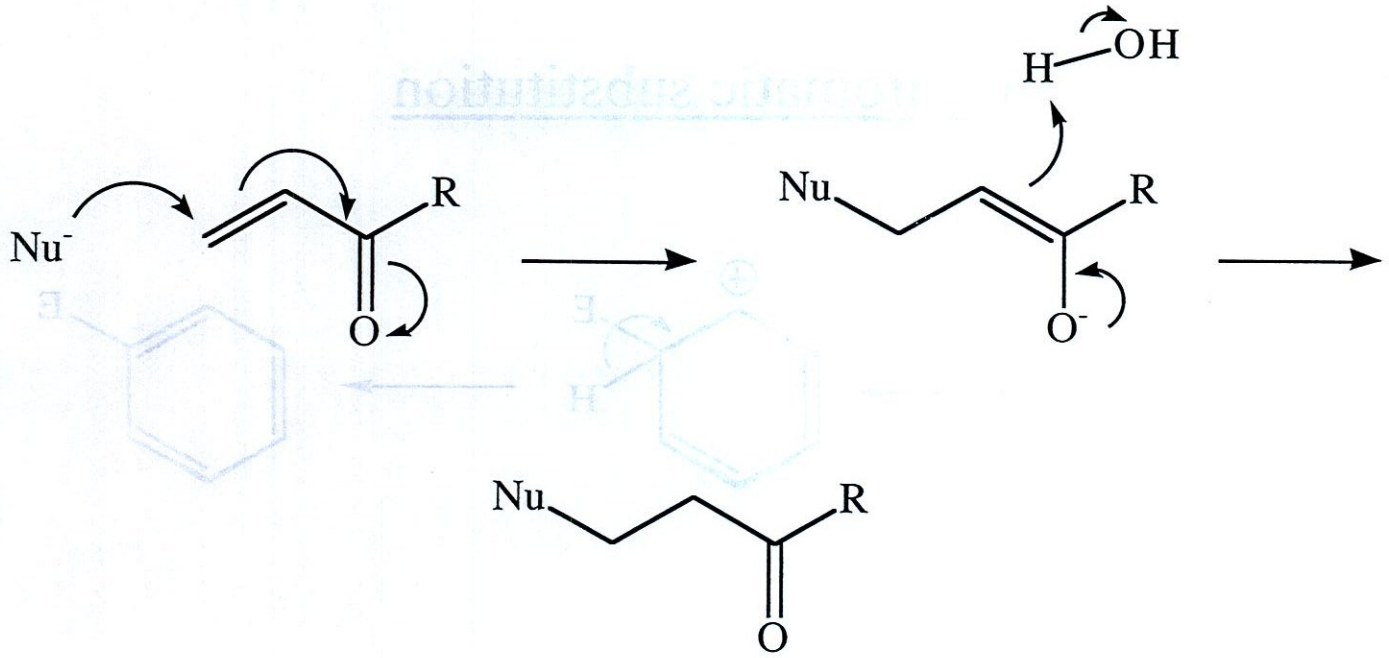


2c. Nucleophilic substitution w/ carbonyl compounds

NAS (acidic)



3. 1,4 Addition (Michael Addition)



4. Substitution (Sn2) (enolates made with LDA and enolates of dicarbonyl compounds)

or Nuc:

5. Electrophilic aromatic substitution