CHEM 342 – Lecture 1 *06/01/15*

Handouts:
- Course Outline
- Best & Worst
- Who are you
- Find someone who
- Review Sheets (on moodle)

Overheads:
- Today's Outline
- Lab Schedule
- What do you need to know

1) Icebreaker: Find Someone Who

2) Course Outline
Go over outline
Test Schedule
Group Project
Lab Schedule & Info

3) What Do You Need to Know?

- Everything from Chem 241 & 242!!!
- General Reactivity trends / Mechanisms
- Acids/Bases
- Resonance
- "Specific" Reactions (review sheets on moodle)

4) Group Exercise: Best & Worst?

Discussion: Each group has 1 minute to present best and worst, then vote!

5) Mechanisms of Reactions

- Key to understanding reactions
- Help us predict reaction products!
- Challenge: proposing mechanisms for "new" reactions
- If we discover a new reaction, we must be able to propose a reasonable mechanism in order to publish.

and provide experimental support/proof

Key point: "There is nothing new under the sun" (almost never!)
- If you are proposing a step in a mechanism that you have never seen before, it is most likely wrong! (look instead for new combinations of steps)

How to propose a mechanism:

**keep in back of your mind where you are going (products) but focus on the reactants:

⇨ What are they most likely to do?

**Only use reactants provided (don't add what you think you need to get there!)

**always consider if you are working in acidic or basic solution

e.g. $R-NH_2 \xrightarrow{H^+} R-\overset{\oplus}{N}H_3$

base solution = Nu^-

acid solution = not Nu^-

Remember: most organic reactions are acid/base

E^+ Nu^-

3 Questions to Ask:

1) What is the strongest acid?
2) What is the strongest base?

} Will generally react together

3) Is there a good leaving group?

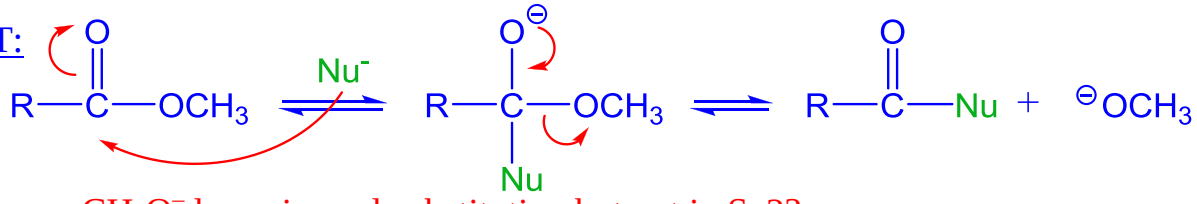
$I^- > Br^- > Cl^- > > F^-$

$^-OSO_2R$ (eg tosyl)

OH^- , OR^- ? ⇨ for S_N1, S_N2 etc, only if protonated first:

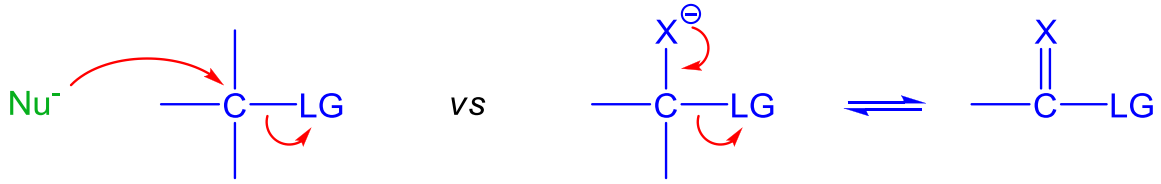
$$ROH \rightarrow ROH_2^+ \therefore H_2O = LG$$

BUT:



Why can CH_3O^- leave in acyl substitution but not in S_N2?

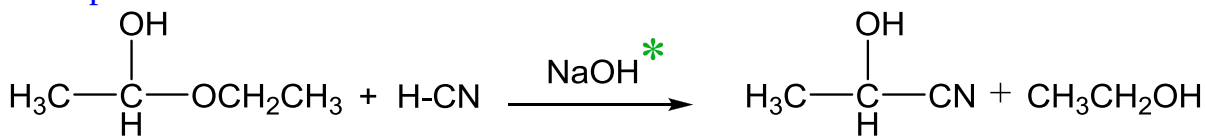
→ because there is a – charge in the molecule to help kick it out!



- If there is a negatively charged atom attached to the same C as the LG, almost anything can leave

* Only H^- and R_3C^- cannot leave → horrible LG's!

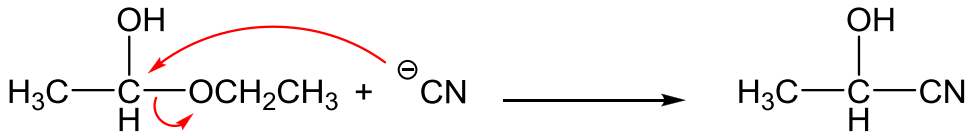
Example:



[* Basic solution ∴ $HCN + NaOH \rightarrow H_2O + Na^+ CN^-$]

- This is a new reaction to us – but each step should be "normal"

Proposal #1 – S_N2 (or S_N1)

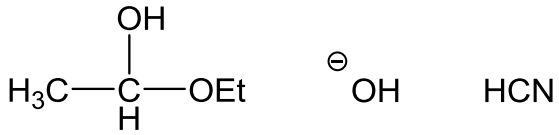


Is it reasonable?
What is wrong?

CH_3CH_2O is NOT a good enough LG for S_N2 or S_N1!

Proposal #2

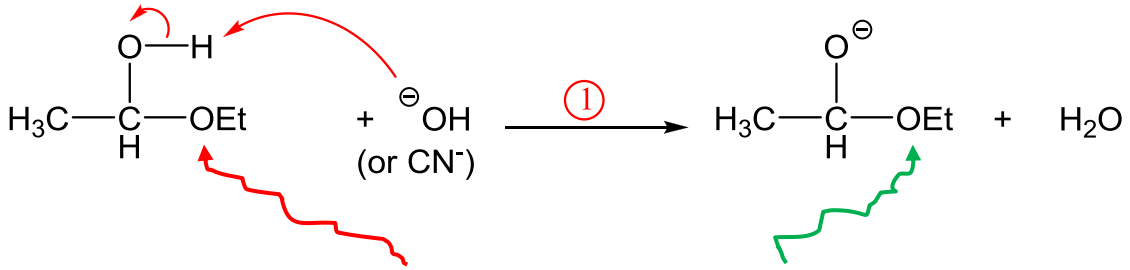
- Instead of focusing on product, focus on reactants:



Q1: What is the strongest acid? HCN
Q2: What is the strongest base? OH

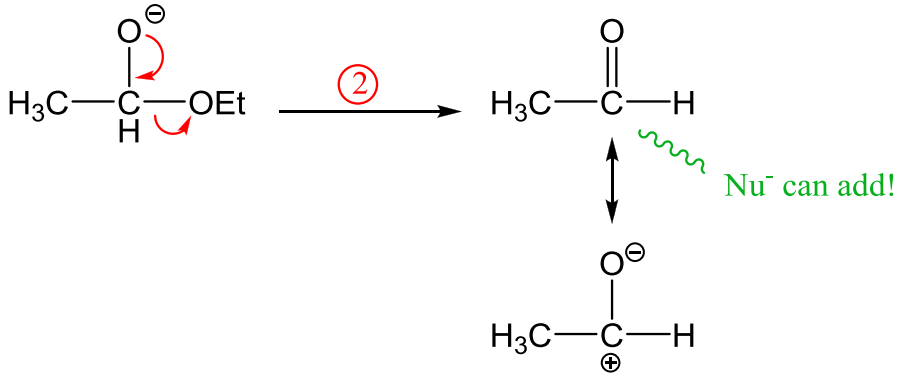
$HCN + OH \rightarrow H_2O + CN^-$

Q1: What is the strongest acid? R-OH
Q2: What is the strongest base? CN or OH (depends if excess NaOH)



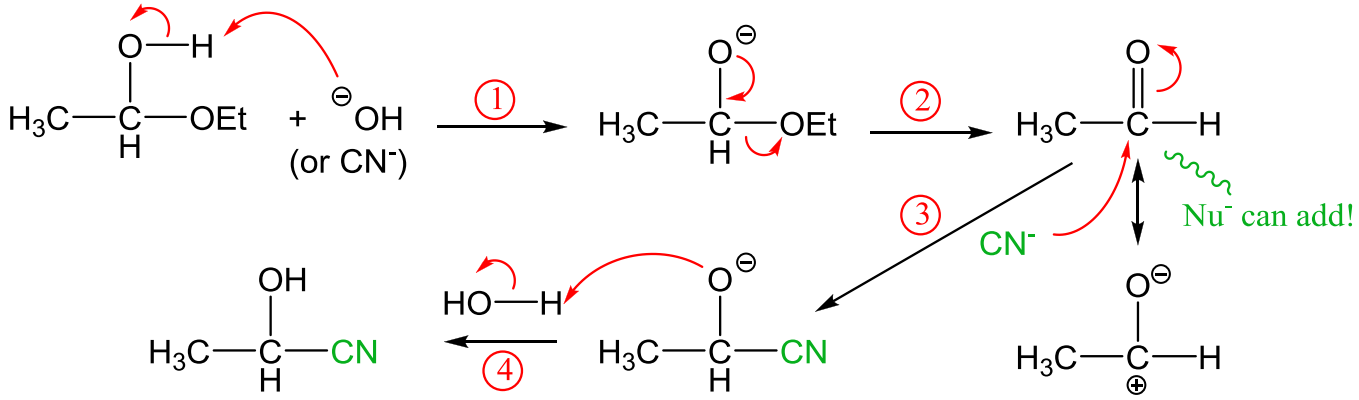
Q3: Is there a good LG? NO

YES – because neg. charged atom on same C



…. Try to finish mechanism for next class!

So far:



① Acid/Base
② LG leaves from tetrahedral intermediate
③ Nu adds to C=O
④ Acid/base

"I know all these reactions" ☺