Carbonyl Chemistry

Strong Acid Present??

Strong Base Present??

- **A1**
- **A2’**
- **A2**
- **A3**
- **A4**

(not the usual case when in acid)

- **B1**
- **B2**

- **N1**
  - **N2’**
  - **N2**

- **X ≠ LG**
- **X = LG**
Hints:

**N1**: If no strong acid or base present what is the only carbonyl fate you can do? And what do you form?

**N2**: What do we look to do first?

**N2’**: If we can’t do N2, what is the ONLY OTHER thing the oxyanionic tetrahedral intermediate does?

**A1**: What do acids normally do?

**A2**: What have you done to the carbonyl reactivity in A1?

**A3**: Do you have oxyanionic tetrahedral intermediate? Do atoms look unhappy?

**A4**: How do you get to product? What do acids like to do?

**A2’**: Think tautomerization in acid...

**B1**: What do bases like to do?

**B2**: What have you formed in B1? Nucleophile, Electrophile? And what does it act on?
Proton Transfer (PT) is quick and easy acid-base chemistry so look to do this for your carbonyl fate depending on if acid or base is present.

The Oxyanionic Tetrahedral intermediate shown in green has ONLY 2 FATES! First, look to kick off leaving group, if this is not possible then grab an available electrophile (usually a proton, H⁺).

The tetrahedral species in red is not anionic therefore it does not have the same fates.

Strong Acid Present??

Strong Base Present??

Protonate

Nucleophilic Attack

Take Care of Charges

Protonate/ Deprotonate as necessary to create LG etc. to get to product

In acid, so try to protonate first

Carbonyl Chemistry

Form Enolate

Nucleophilic Attack: Form Oxyanionic Tet. Int.

Kick off LG, reform Carbonyl

Nucleophile Still Present??

Carbonyl Still Reactive??

Carbonyl Present??

Form Enolate

Grab Electrophile (Sn2 with carbon, protonate to form enol...)