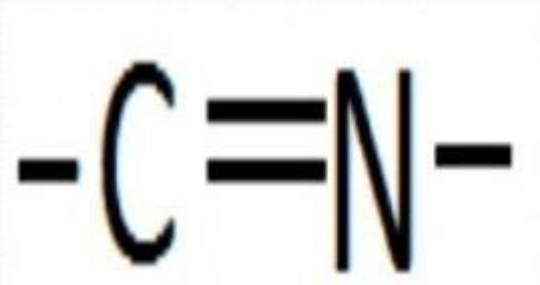
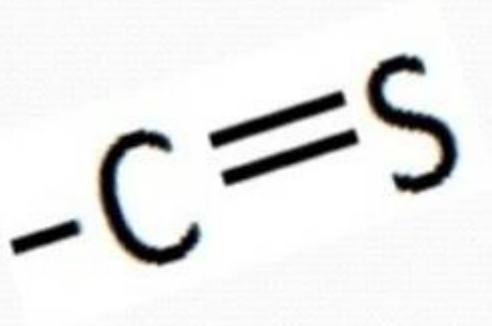
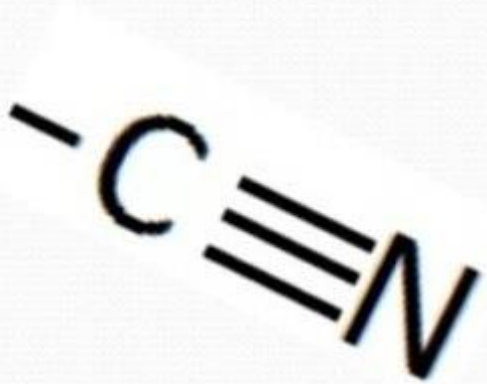
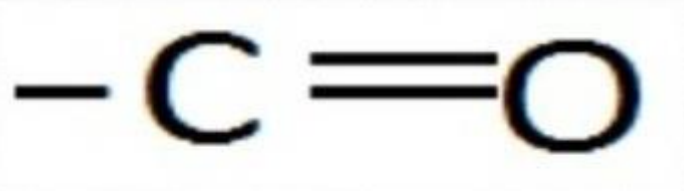
CARBON:-HETERO MULTIPLE BONDS

Addition to carbon heteromultiple bonds



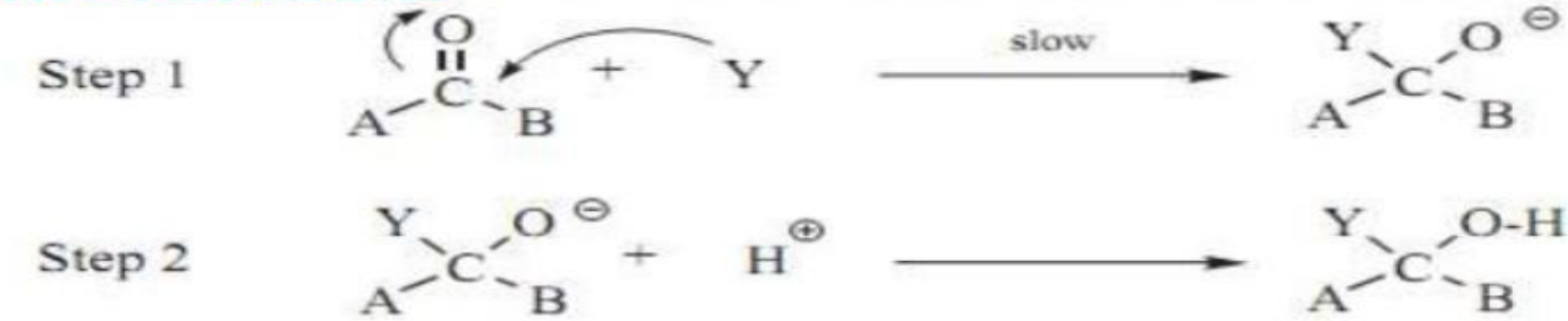






Addition to $-C=O$

mechanism



•Who attack first ???????????

•Always nucleophile attack first ,in some cases electrophile may attack but rate determining step is always addition of nucleophile.
•How they will attack???????????????

•If at beta position electron withdrawing group is present ------- syn

•If at beta position electron releasing grouup is present ----------anti

the addition reaction to the carbon hetro multiple bonds

- Carbon nitrogen bond

1. $C \equiv N$
2. $C=N$

- Carbon oxygen bond.

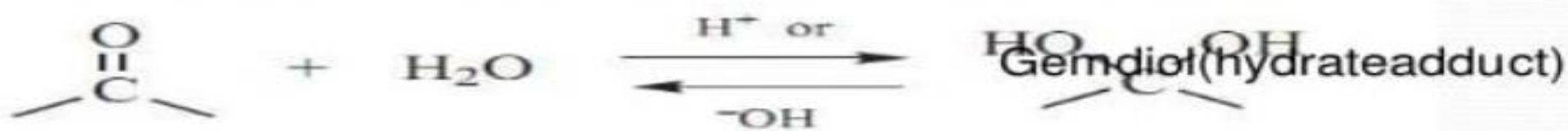
- $-C=O$

Since C=O, C=N, and C≡N bonds are strongly polar, with the carbon always the positive end (except for isocyanides,),

Reactions

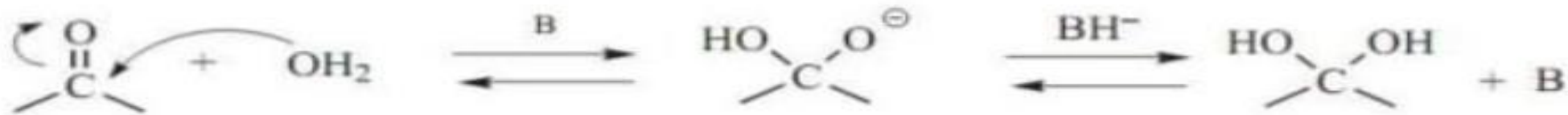
Attack by hydroxyl group

The Addition of Water to Aldehydes and Ketones: Formation of Hydrates

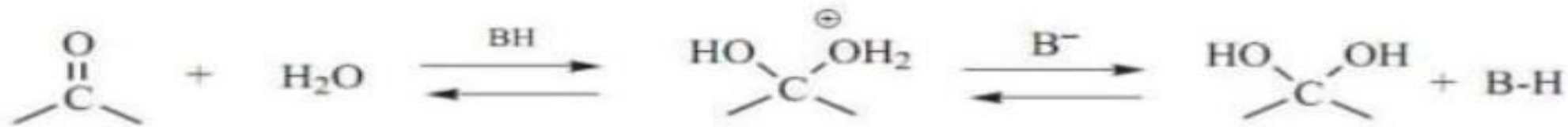


Mechanism

Mechanism *a*
(Acid)



Mechanism *b*
(Base)

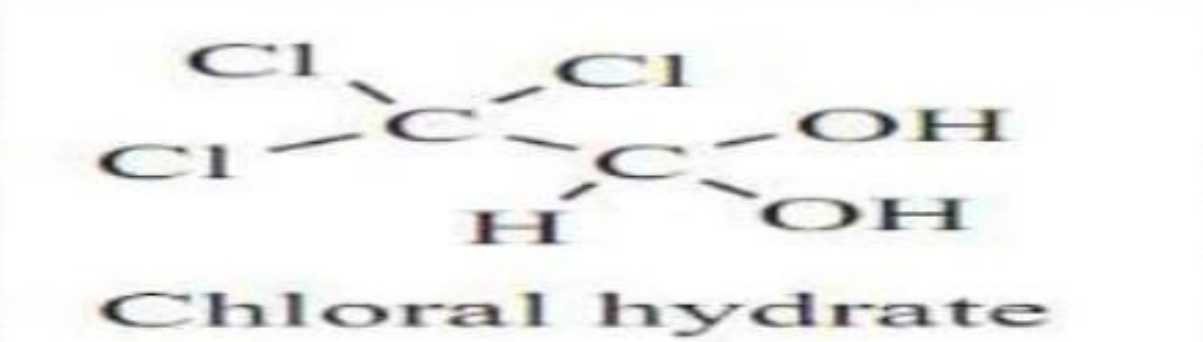


Stability of hydrate

+ I ---------- decrease the stability
--I ---------- increase the stability

Eg

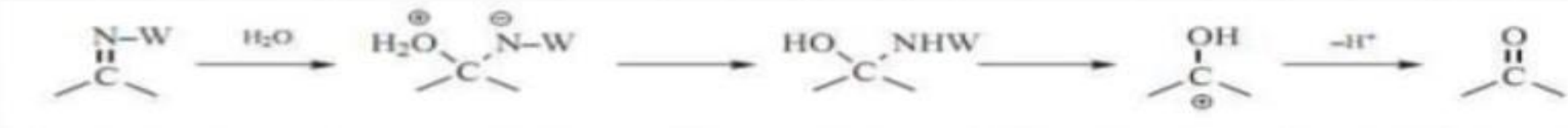
1 Hydrate of chloral are stable



Chloral hydrate

Addition of water to carbon nitrogen double bond

mechanism



Reagents used to cleave carbon nitrogen double bond

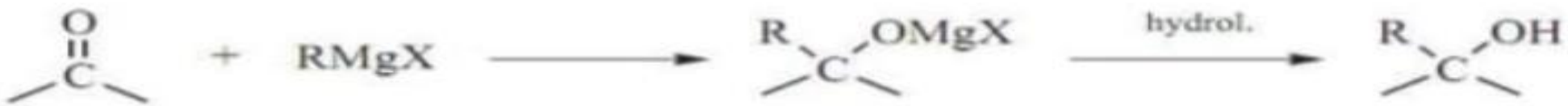
1 Th(III) nitrate
2 Aq TiCl3
3 CH3COOH

W------OH (oximes)
W-------NHCONH2
(semicarbazone)
W--------- NHAr(arylhydrazone)
W--------Ar(shiffs base)

Attack by organo mettalic compounds

Grignard reaction

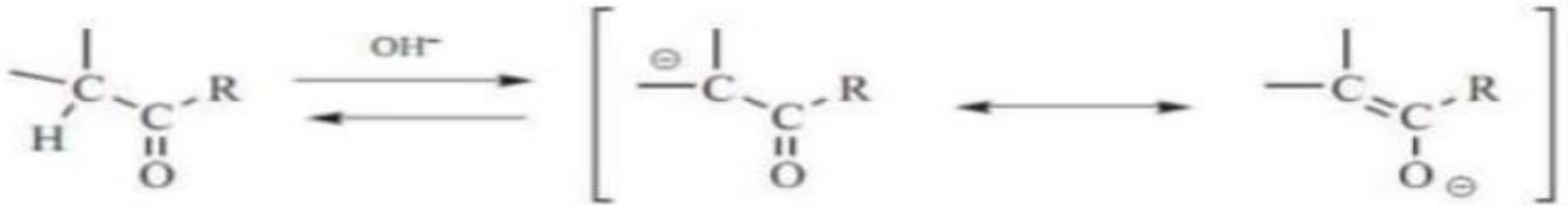
Organomagnesium compounds, commonly known as Grignard reagents (RMgX), are formed by the reaction of alkyl, vinyl, or aryl halides with magnesium

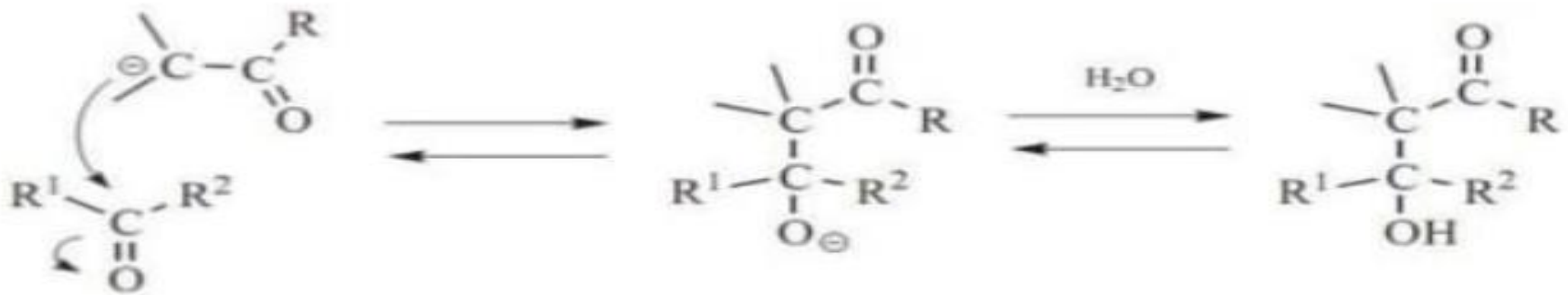


- Formaldehyde ----------primary alcohol
- Other aldehyde --------- sec alcohol
- Ketone --------- tertiary alcohol

Carbon Attack by Active Hydrogen Compounds
Aldol rections

Reactions are base-catalyzed condensations. base removes a CH proton to give a carbanion, which then adds to a CO. The oxygen acquires a proton, and the resulting alcohol may or may not be dehydrated, depending on whether an a hydrogen is present and on whether the new double bond would be in conjugation with double bonds already present.





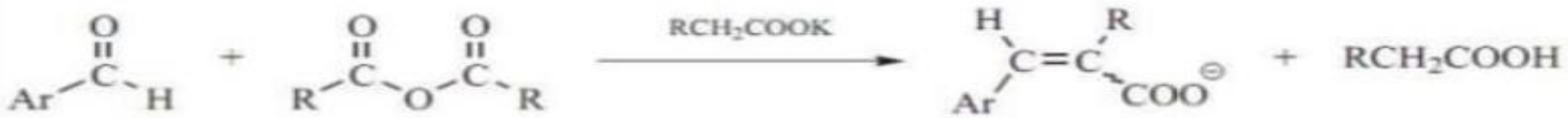
Retrograde aldol reaction becauuse all the steps are reversible

Scope of aldol reactions

1. Two same aldehyde with alpha H
2. Two same krtone wiith alpha H
3. Two different alldehyde one may not haver alpha H
4. Two different ketone
5. One aldehyde and one ketone.:-feasable if aldehyde has no alpha hydrogen ,if aldehyde also having alpha hydrogen only alpha carbon of the ketone will add to the carbonyl cabon of aldehyde

The Perkin Reaction

The condensation of aromatic aldehydes with anhydrides is called the Perkin reaction



Base is generally the salt of acid corresponding to the acid anhydride,.
Alpha hydroxy never isolated always dehydrated to form α-β unsaturated compounds

When acid anhydride contains only one active methylene hydrogen then hydroxy compounds can be isolated.

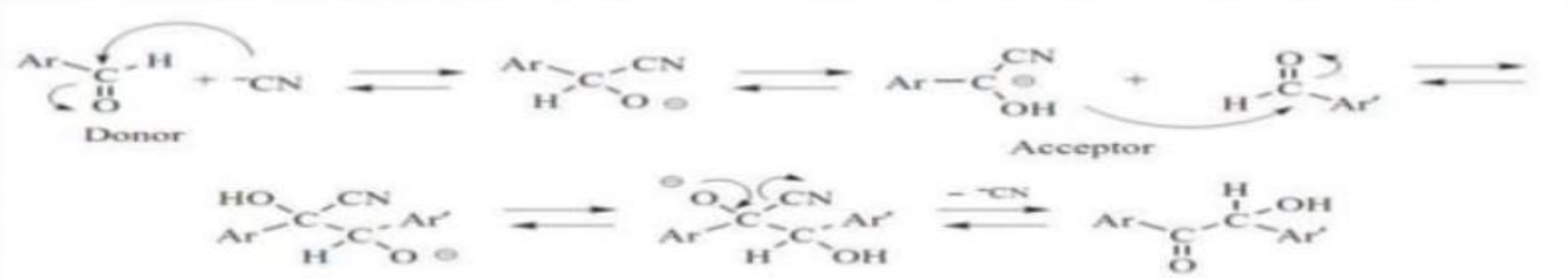
$$(R_2CHCO)_2O$$

Benzoin condensation

When certain aldehydes are treated with cyanide ion, benzoins are produced in a reaction called the benzoin condensation

reaction

Mechanism



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