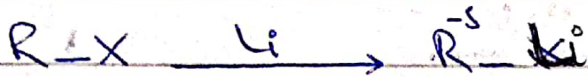
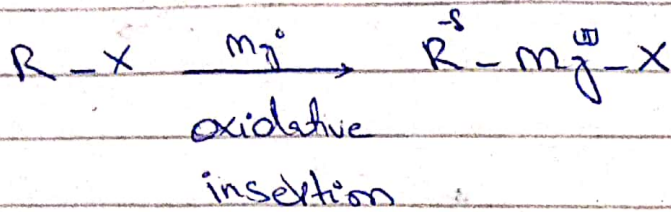


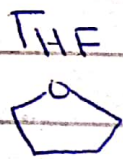
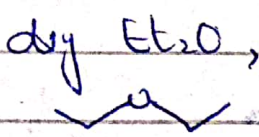
# C-C bond formation

## Organometallic

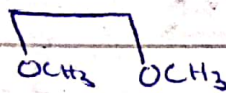
$RMgX$  Grignard reactions



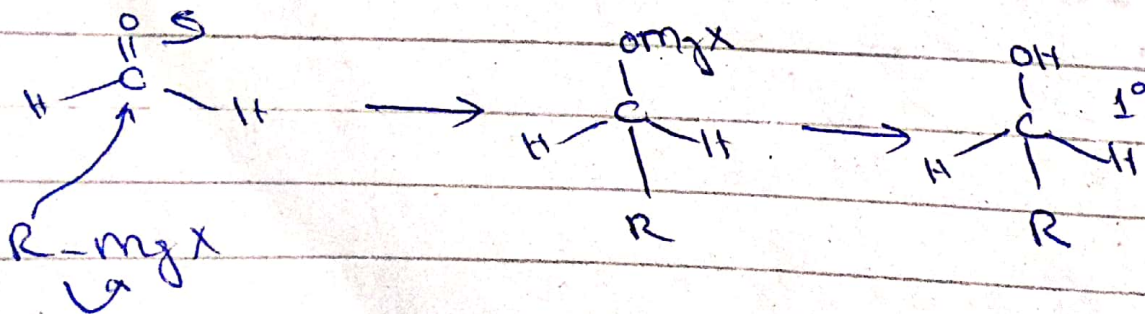
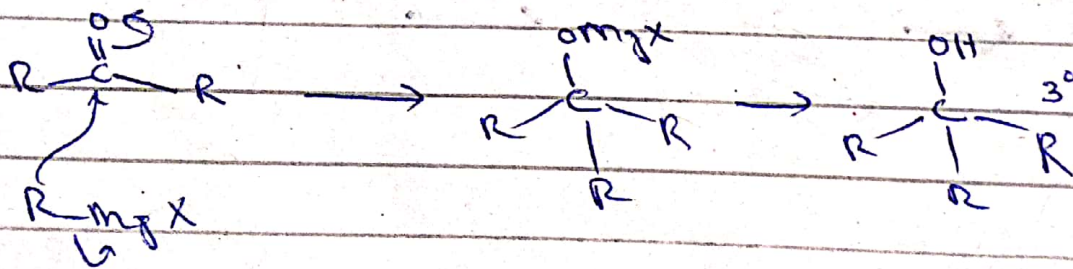
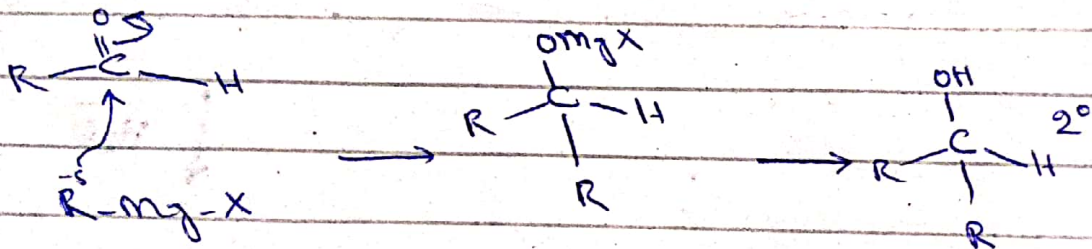
## Solvents:-



BME

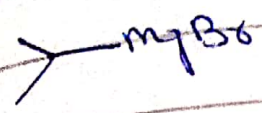


dimethoxy ethane.

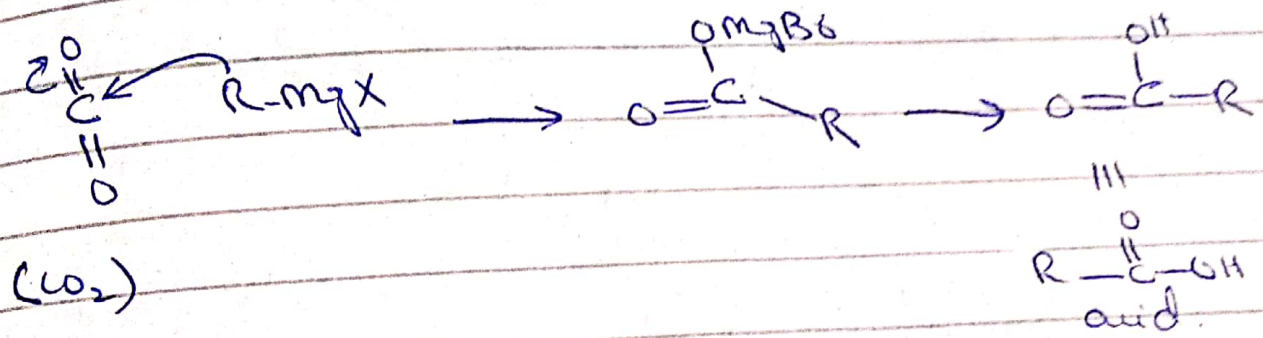


every type of Grignard aliphatic alcoholic can be formed.

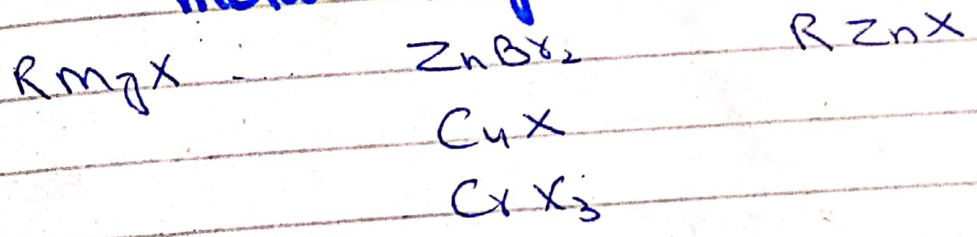
PhMgBr, MeMgBr, EtMgBr  
 all these are commercially available.



Iodide expensive Cl less reactive so Bromide used

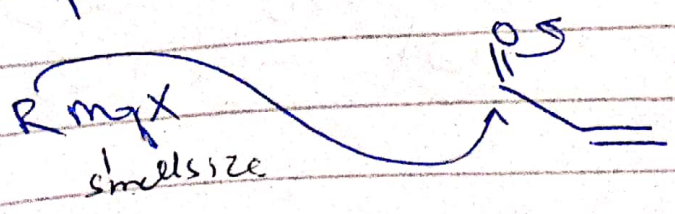


**metal exchange reaction**



Mg directly insert but all metal can't insert directly so first form R-MgX then react them with salt of require metal & insert that metal.

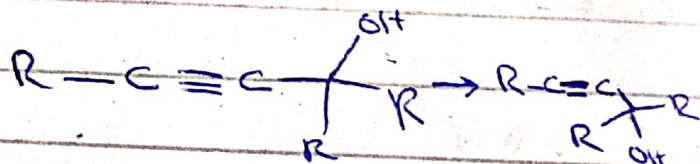
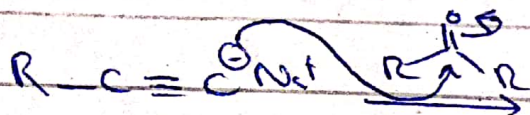
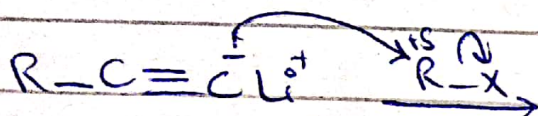
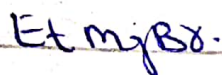
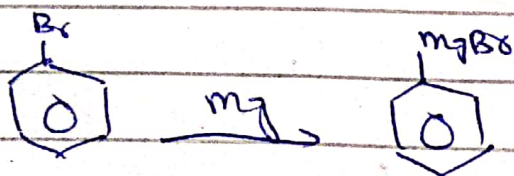
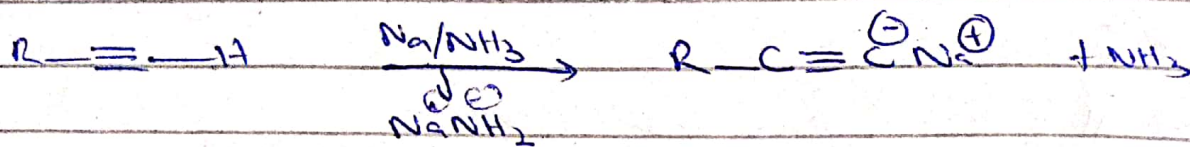
By metal exchange reaction nature of R change e.g. in Cu R become soft bcz Cu is soft.



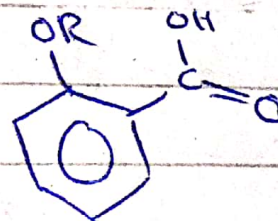
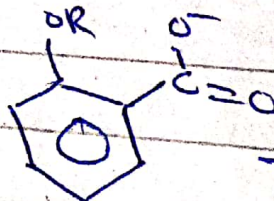
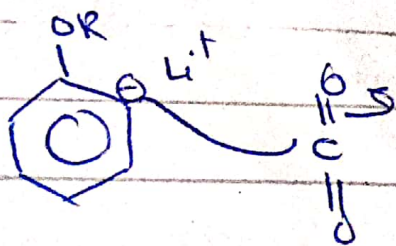
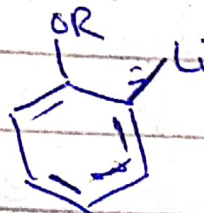
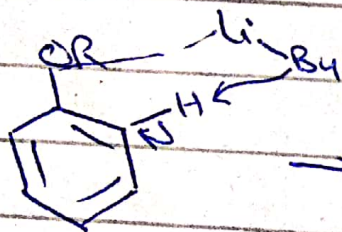
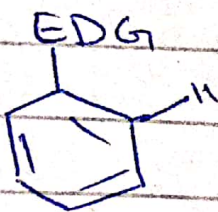
1,2 addition only not 1,4.



we take R-X instead of R-H bec R-X has more polarity  
 But alkyne directly made carbanion



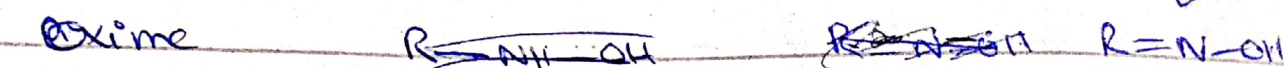
### Ortho lithiation



OR, NR donating

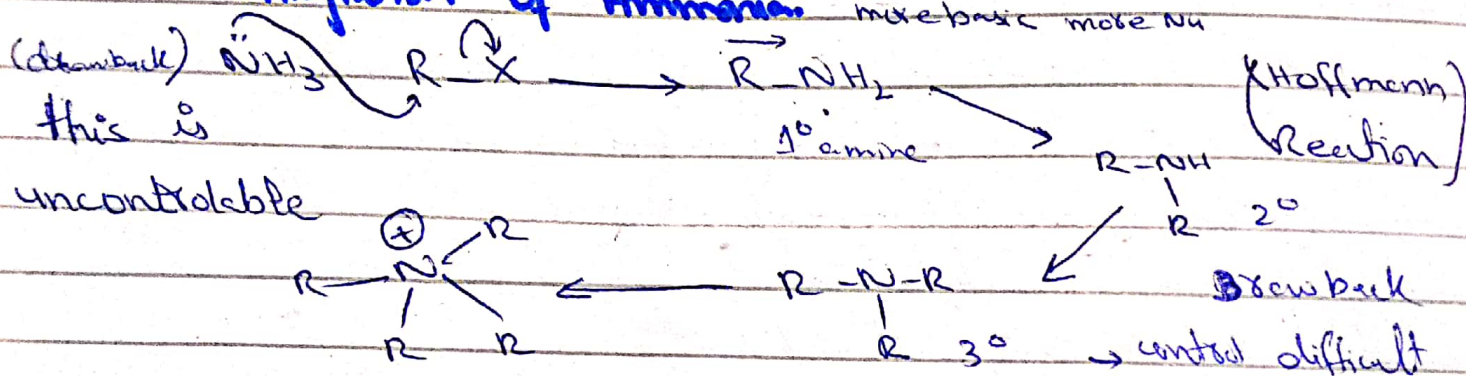


# C-N bond formation

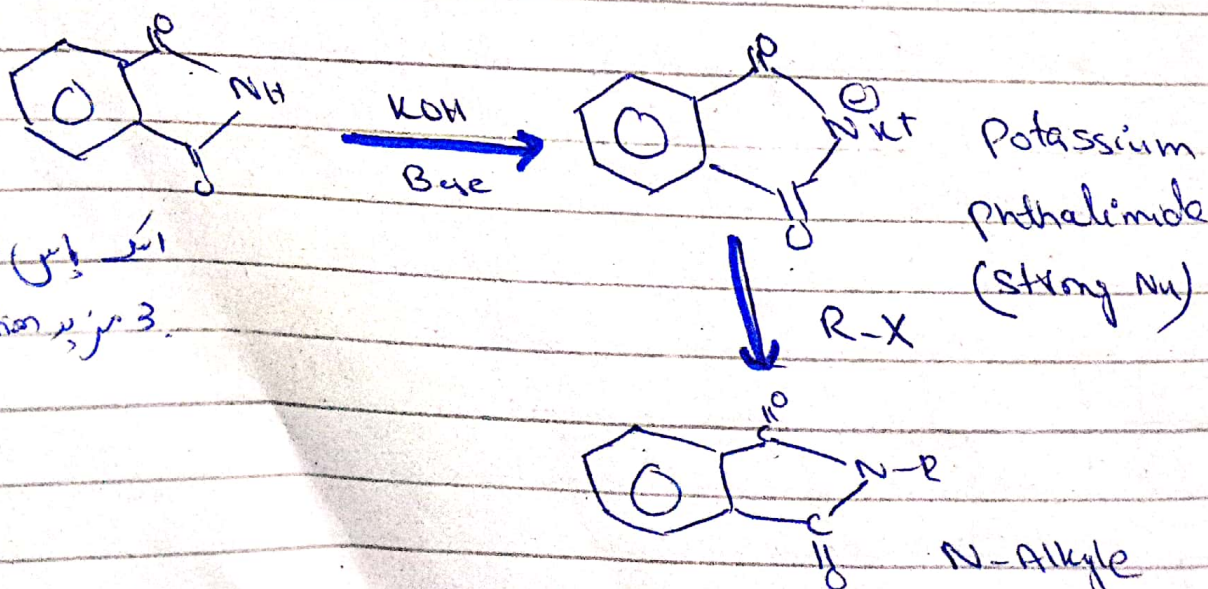
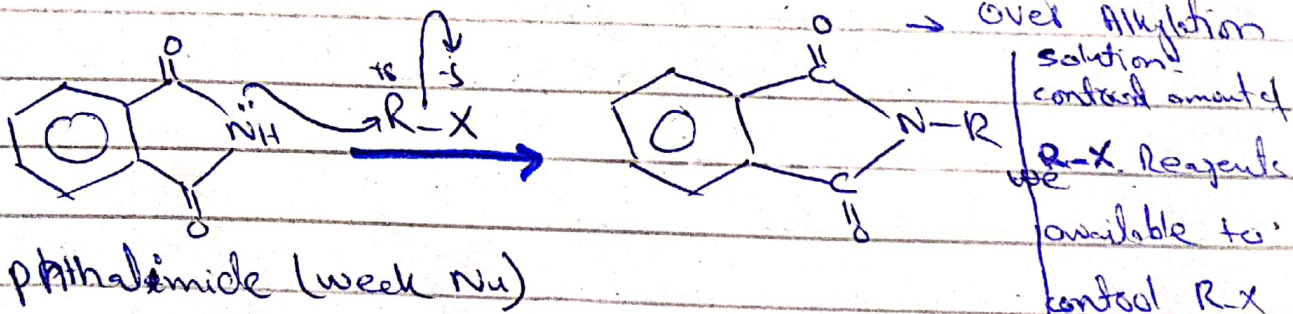


by carbonyl

## Alkylation of Ammonia

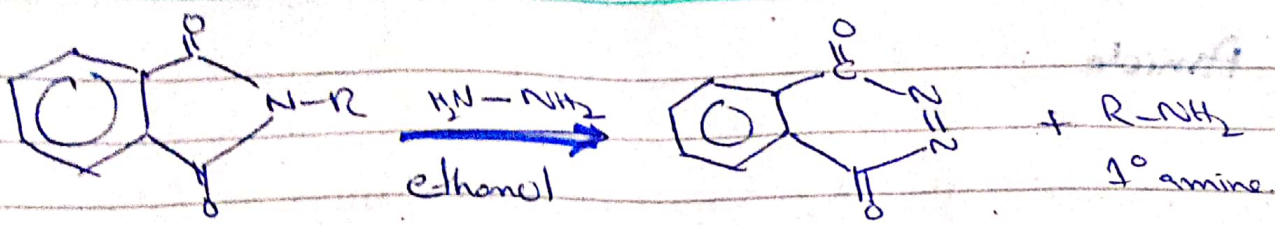


## Gabriel Synthesis



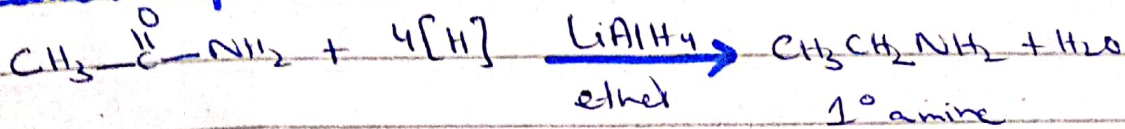
اس کے H اور Alkylation کے ہیں





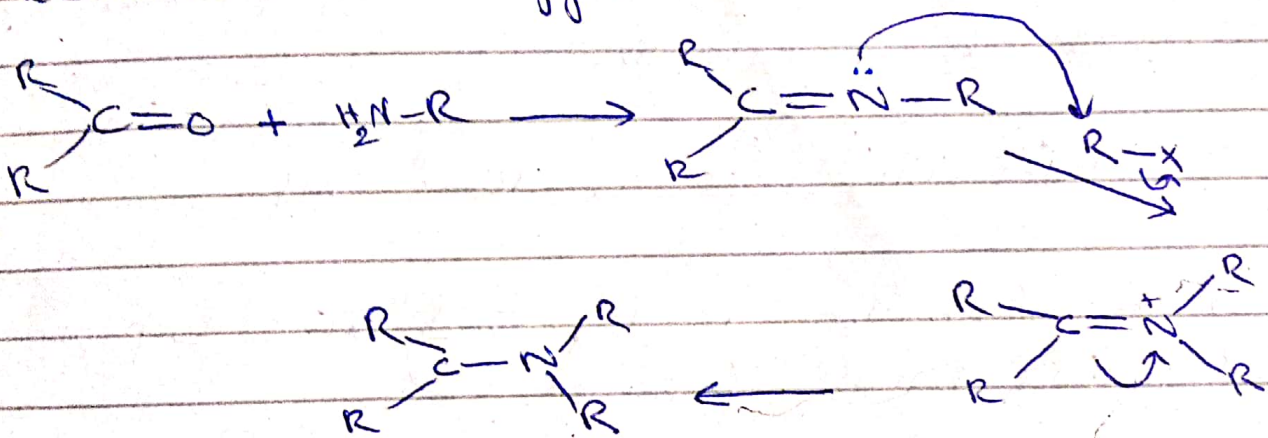
For cleavage of C-N bond we use hydrazine & done reduction

### Reduction of amide



### For 2° amines

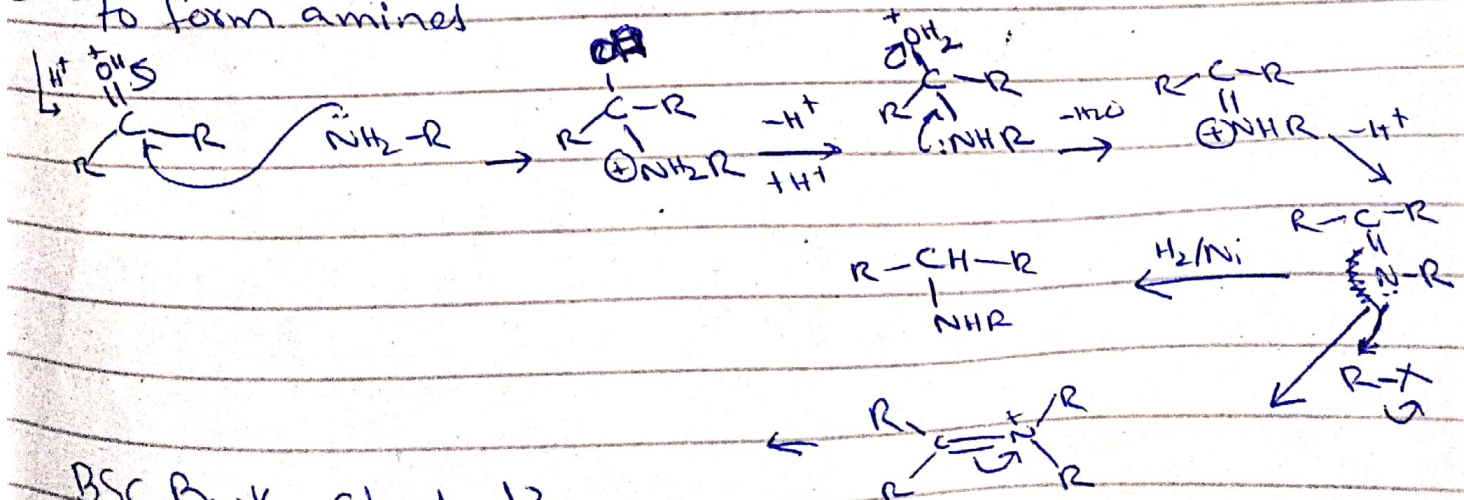
Reduction methodology is used.



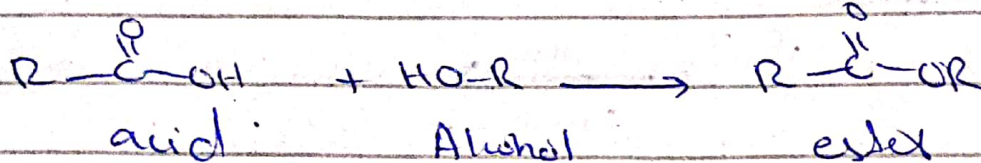
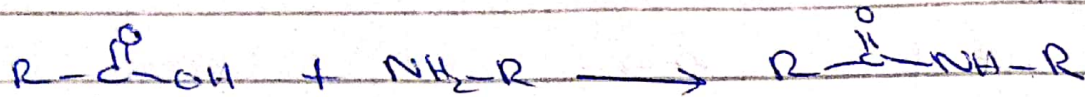
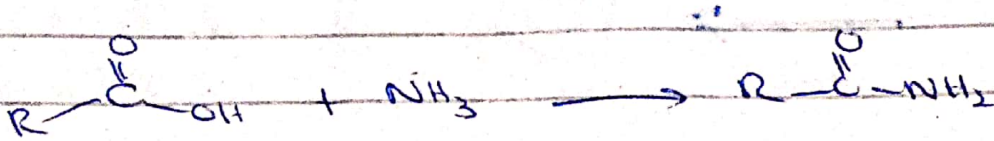
**Reductive amination** means converting aldehyde or ketone

into amine - Reaction Begins with the addition of ammonia

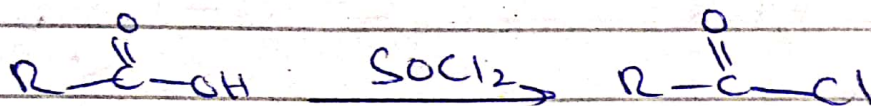
or amine to carbonyl group - imine form which reduced to form amines



## Amide



these reaction are v. difficult to  $\overset{\overset{O}{\parallel}}{C}-OH$  bcz it is less reactive so form acylhalide which are more reactive.



amide formation is important due to peptide (amide) bond formation.  
more sensitive.

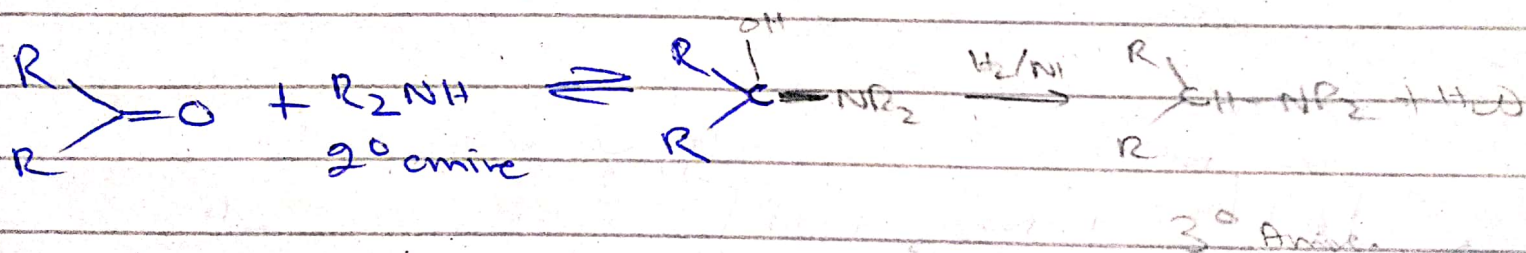
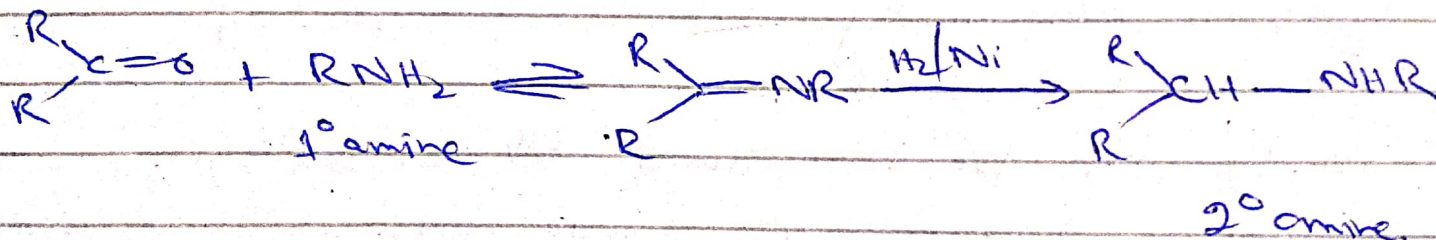
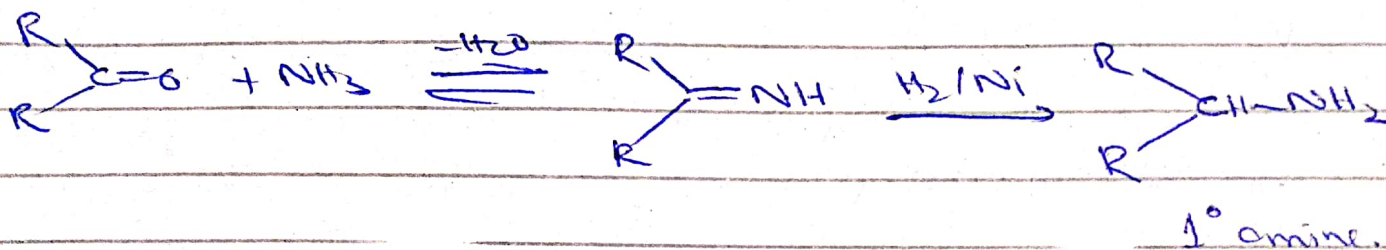
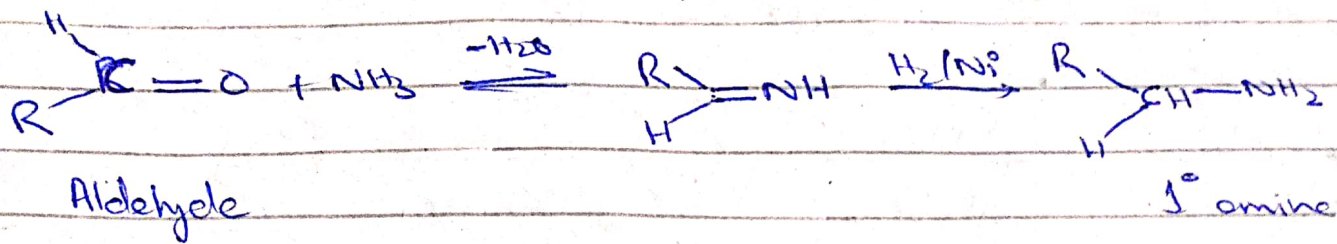
diff. activators used.

delicate chemistry.

Soft activating agents used to activate carboxylic acid - at then and these activators removed.

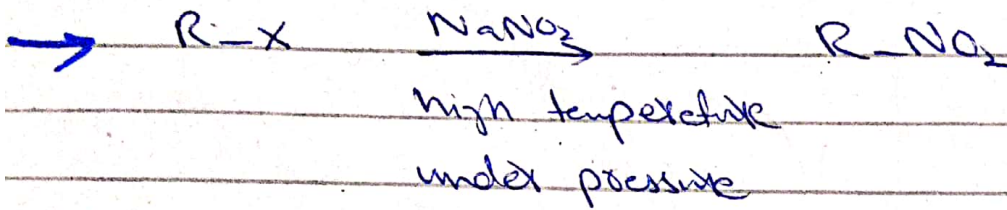
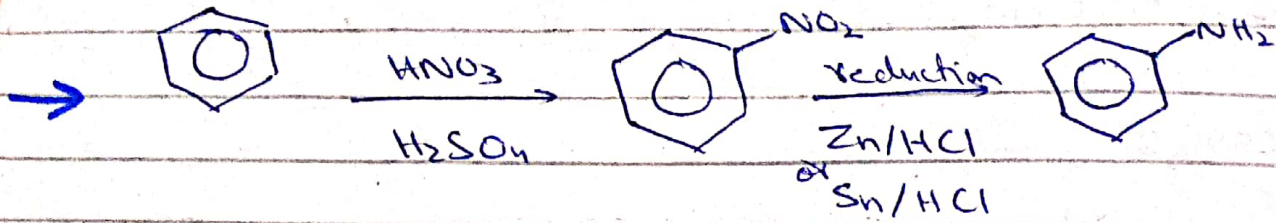


## Reductive Amination:-



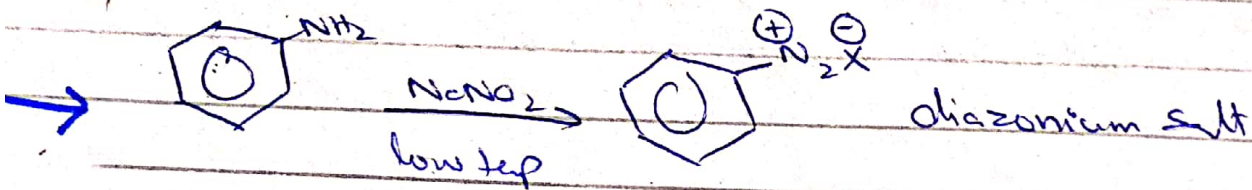
# Nitro group

$\text{NO}_2$  act as electrophile.



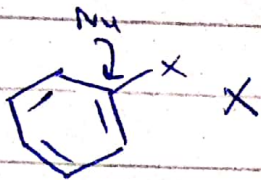
hydrides are mostly used for reduction of  $\text{C}=\text{C}$   
 $\text{LiAlH}_4, \text{NaBH}_4$

$\text{Pd, Pt, Ni}$  for reduction of alkenes. synthesis  
 $\text{Zn}$  - powder form,  $\text{Sn}$  granule form. for  $\text{NO}_2$  reduction

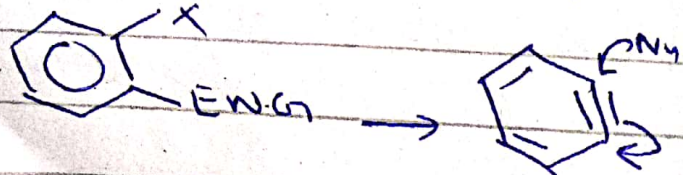


diazonium salt are intermediates  $\text{N}_2$  is good L.G.

As  $\rightarrow$  ESR Electrophilic substitution reaction.



for the at ortho EWG present

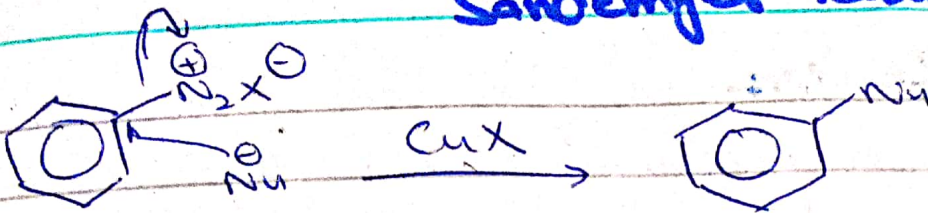


## Nucleophilic Substitution.



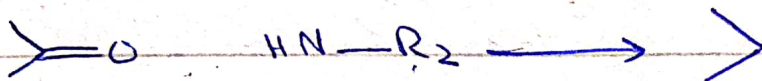
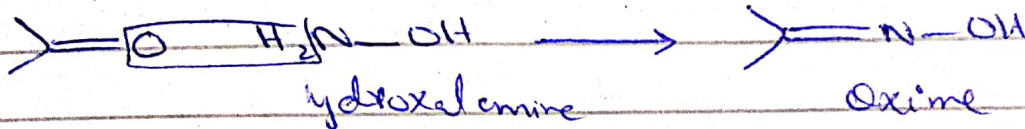
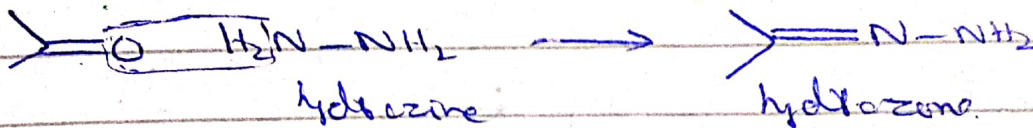


## Sandmeyer reaction



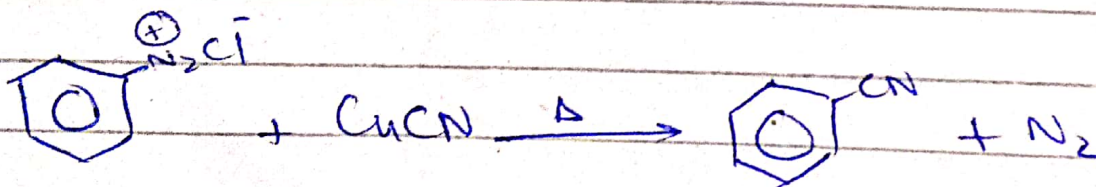
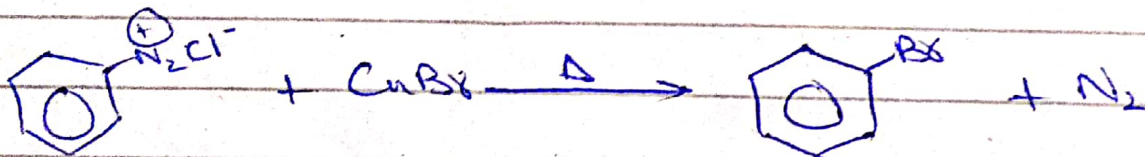
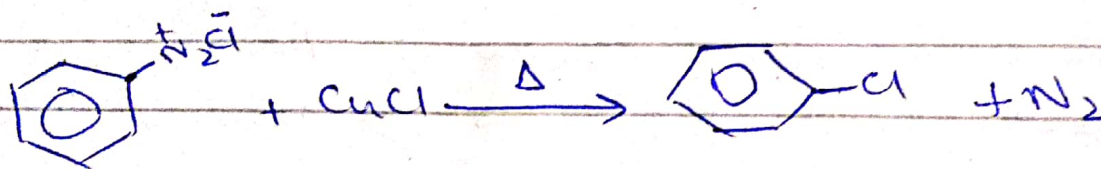
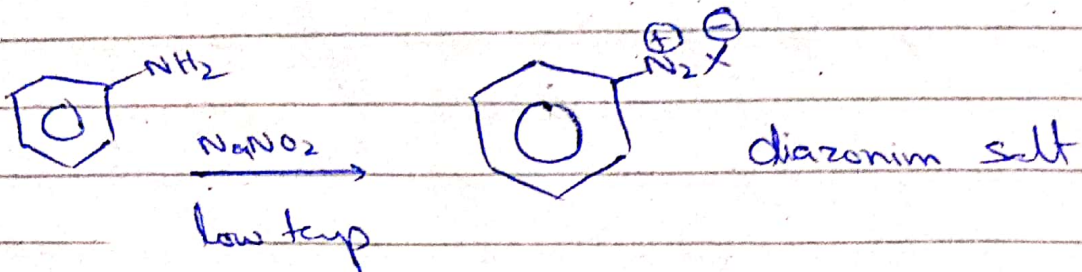
Page 418

all are acid catalyzed reactions.

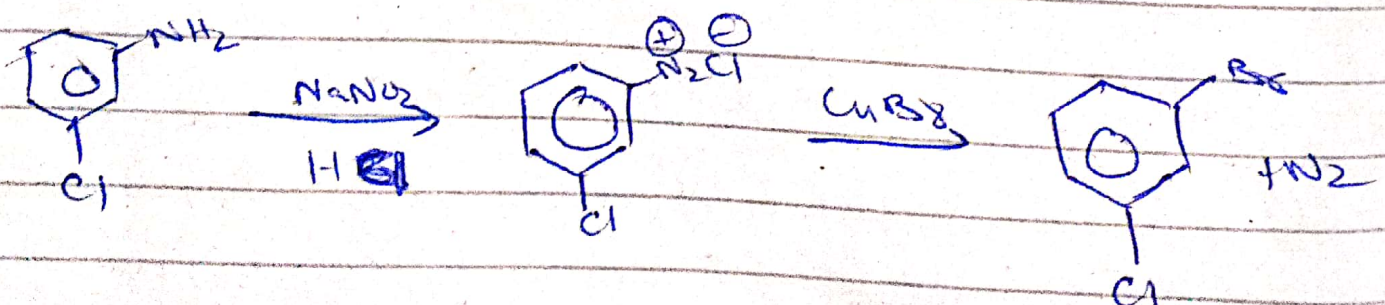
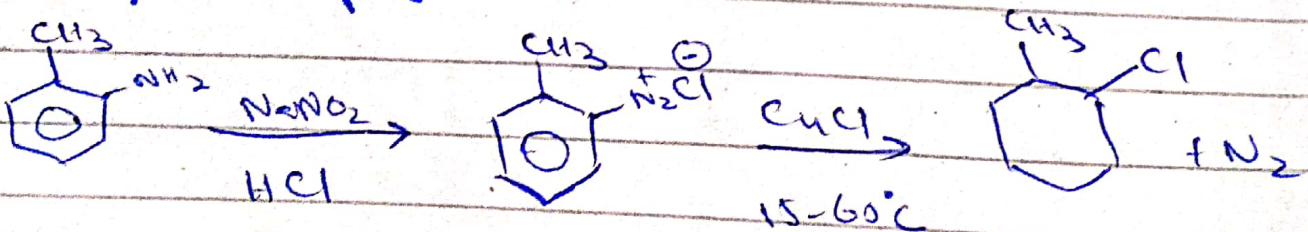


# Sandmeyer Reaction:

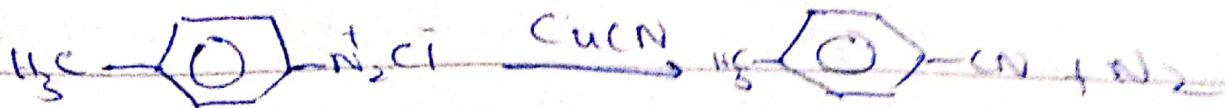
Replacement of diazonium group by  $-Cl$ ,  $-Br$ ,  $CN$  cold aryl diazonium salt react with cuprous chloride, cuprous bromide & cuprous cyanide to form Aryl chloride, Aryl Bromide or Aryl Nitrile.



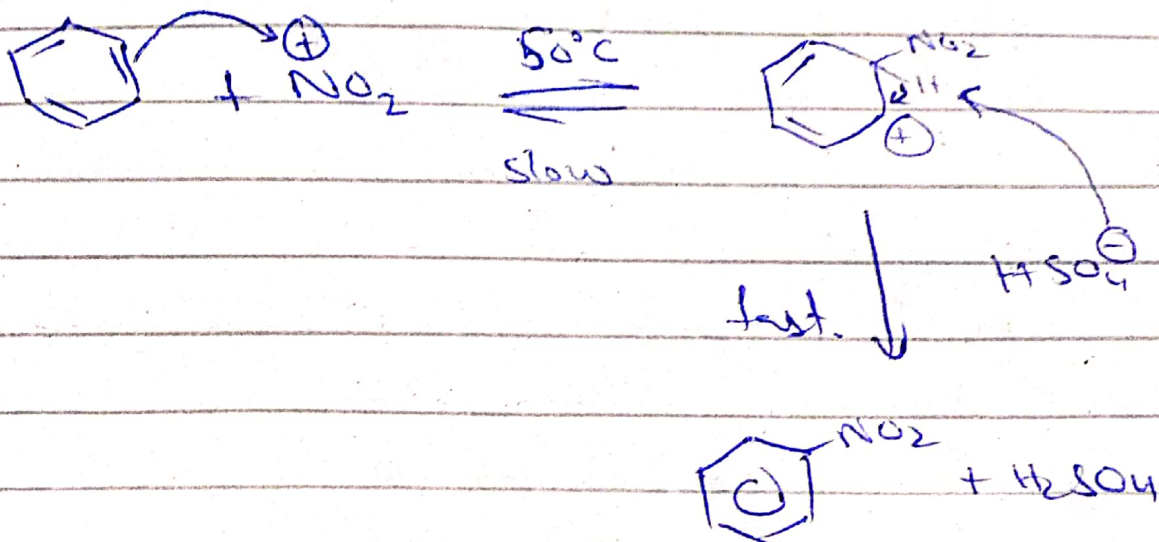
## Specific examples:







## Nitration of Benzene mechanism:-



## C-N bond formation

Wolff Rearrangement

Schmidt Rearrangement

Curtius Rearrangement

Lossen Rearrangement

Hoffman Rearrangement

Bacmann Rearrangement  $\rightarrow$  lactams

Nebel Rearrangement  $\rightarrow$   $\alpha$  amino ketone

Oxymutation - demutation

isocyanides