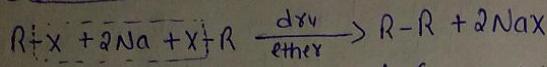


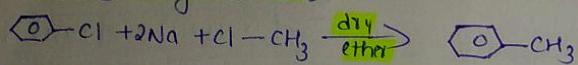
HYDROCARBONS

1. WURTZ REACTION

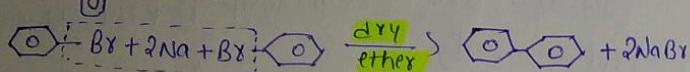


- Coupling reaction
 - Higher alkanes are formed
 - Free radical intermediate is formed
- $\text{CH}_3^+ \text{Cl}^- + 2\text{Na} + \text{Cl}^-\text{CH}_3 \xrightarrow[\text{ether}]{\text{dry}} \text{CH}_3-\text{SH}_5$

2. Wurtz Fittig Reaction :-

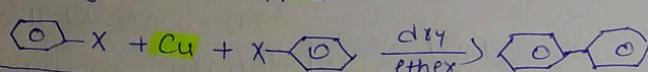


3. Fitting Reaction :-



4. Ullmann Reaction :-

- Fitting with copper is Ullmann.



5. Frankland Reaction :-

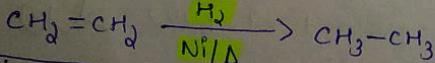
- $2R-X \xrightarrow[\text{ether}]{\text{Zn}} R_2\text{Zn} + 2\text{NaX}$
- $R_2\text{Zn} + R'-X \rightarrow R-R'$ (alkane)
- Symmetrical/unsymmetrical alkanes are formed
- CH_4 can't be prepared

6. Corey-House Synthesis

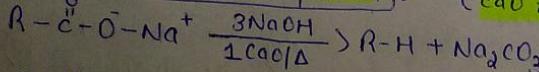
- $R-X \xrightarrow[\text{CuX}]{\text{Li}} R_2\text{CuLi}$
- $R_2\text{CuLi} \xrightarrow{\text{R}'-X} R-R' + \text{CuX}_2 + \text{LiX}$
- This reaction is preferred for unsymmetrical alkanes

7. Sabatier & Senderen's Reaction

- Hydrogenation in presence of Nickel/ Δ



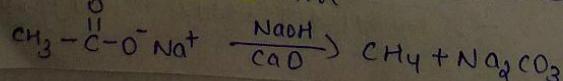
8. Soda lime decarboxylation :- (NaOH (3:1) / CaO & remove CO_2)



- Product has ① carbon less than reactant.

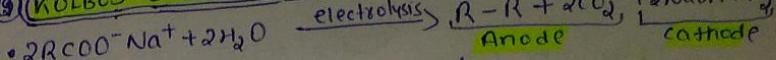
• 3:1 ratio | Removal of CO_2

• Carbanion intermediate | Rate of α de carboxylation & Stable form of carbanion



(yellow)

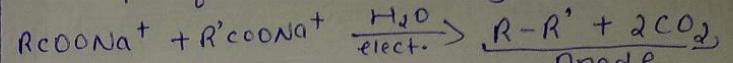
9. KOLBE'S ELECTROLYSIS



Anode cathode

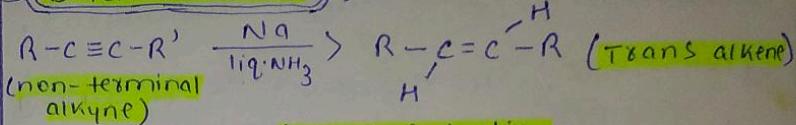
• Free radical intermediate | CH_4 not formed

• The pH of final sol. is greater than 7.



Anode cathode

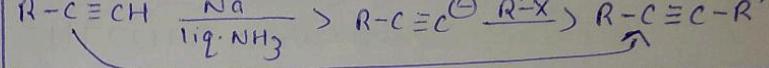
10. BIRCH REDUCTION :-



(non-terminal alkyne)

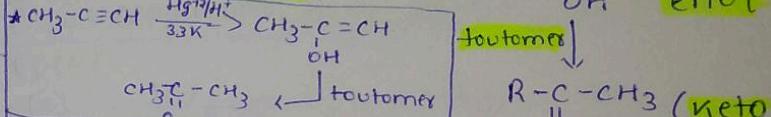
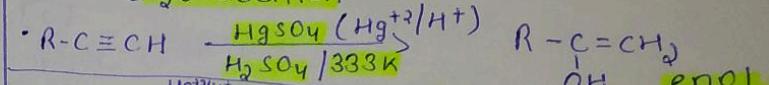
Partial Reduction

Anti Addition

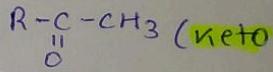


11. KUCHEROV'S Reaction (Markonikov rule)

CH_2O addition

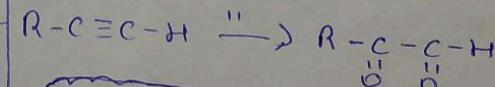
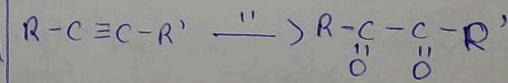
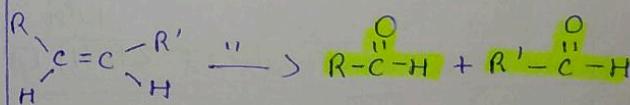
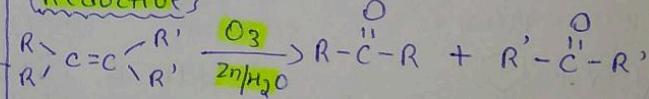


tautomer

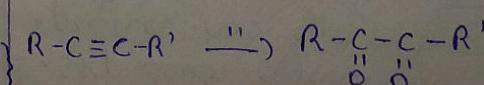
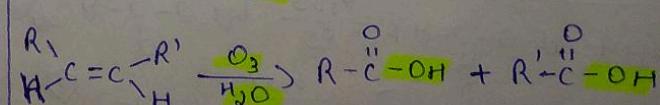
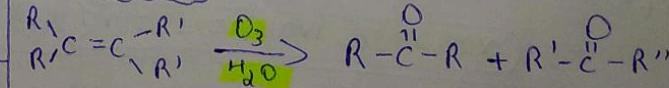


12. Ozonolysis :-

Reductive

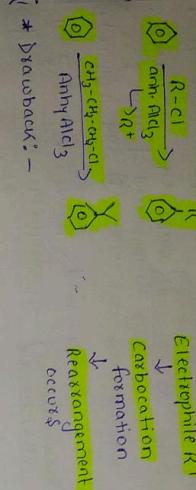


Oxidative



formed. A secondary carbonyl compound is

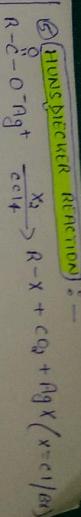
(3) FRIEDEL-CRAFTS ALKYATION :-



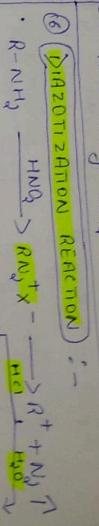
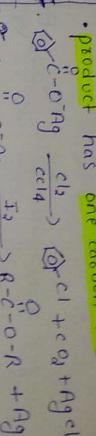
* Drawback:-

can't be formed

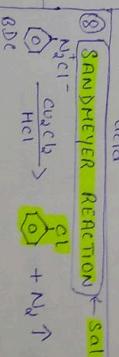
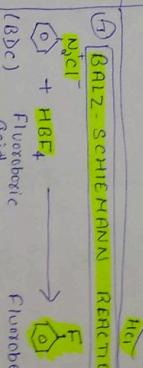
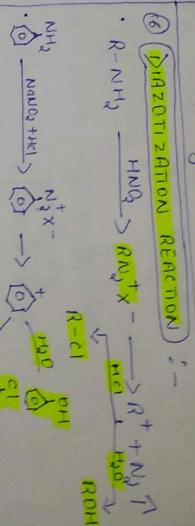
ELECTROPHILIC SUBSTITUTION



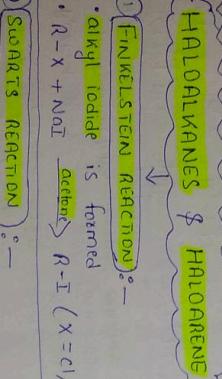
- Step down reaction
 - product has one carbon less



ROH



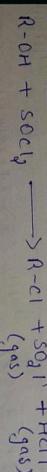
HALOALKANES & HALOARENES



SWEAT'S REACTION :-

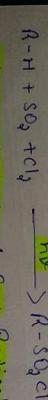


DARZEN PROCESS :-



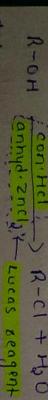
• In product two gases are formed,
 $\text{R}-\text{Cl}$ has good yield.

REED REACTION :-



• chlorosulphonation / free Radical

LUCAS TEST →



• Anhyd zincic Lucas reagent

* distinguish b/w 1° & 3° alcohol

* alcohol gives turbidity with lucas reagent

3° alcohol → immediately turbidity

2° alcohol → slow turbidity

1° alcohol → 30 min turbidity (even though)

ALCOHOL-PHENOL-ETHER

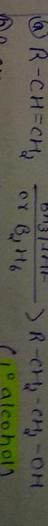
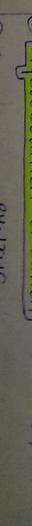
ACID-CATALYZED HYDRATION (MARKOVNIKOV)

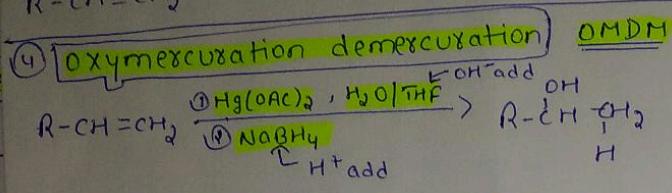
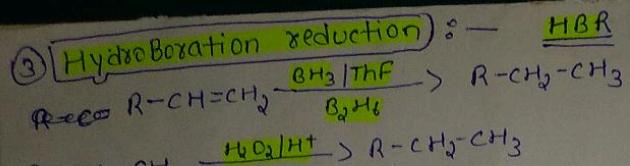


• carbocation intermediate / rearrangement
 • Higher degree alcohol is formed

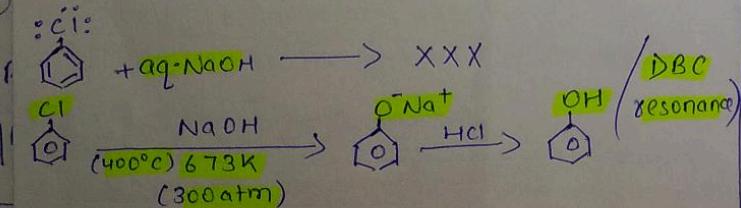
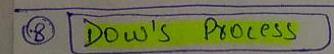
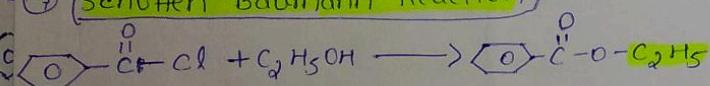
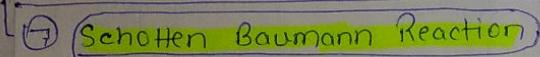
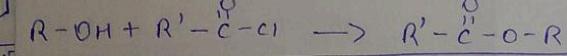
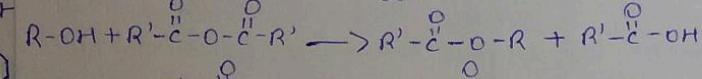
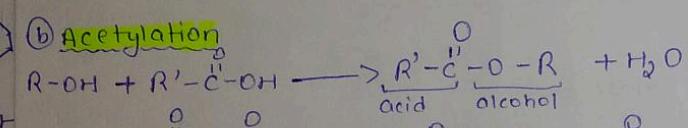
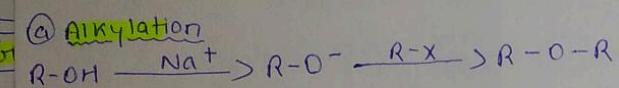
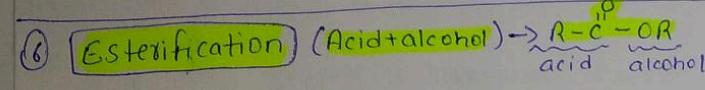
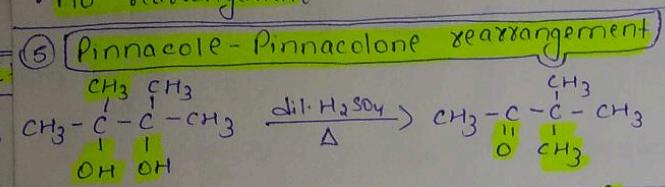
• Hofmann with Rearrangement

HYDROBORATION OXIDATION (LANK), TBC

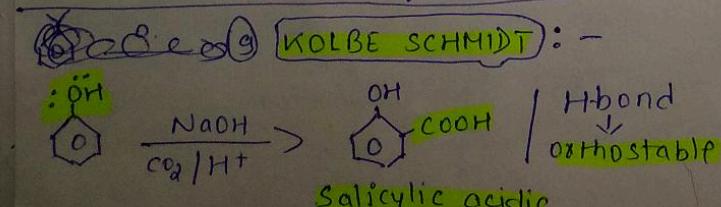




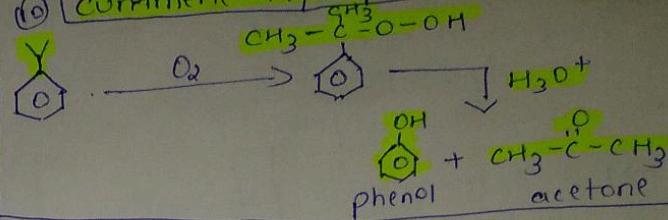
- Markonikov without rearrangement
- anti addition
- no rearrangement



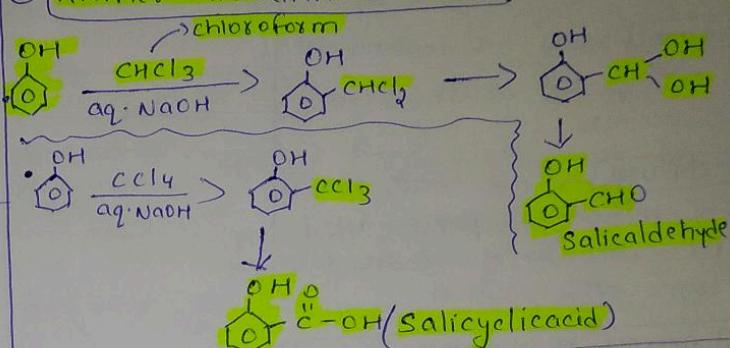
Industrial preparation of phenol



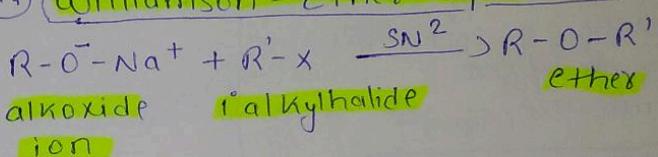
⑫ Cumimene Hydroperoxide reaction



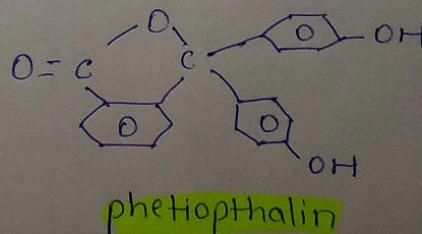
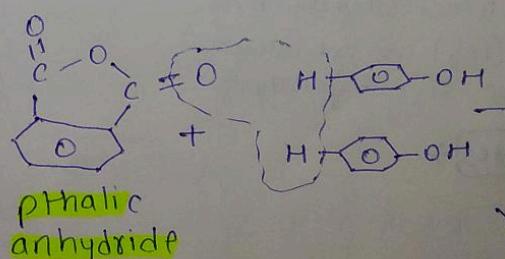
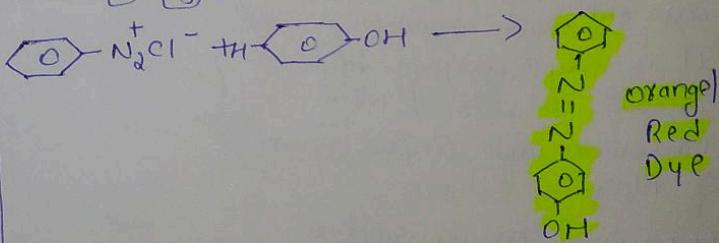
⑬ Riemer - Tiemann Reaction :-



⑭ Williamson - Ether synthesis :-

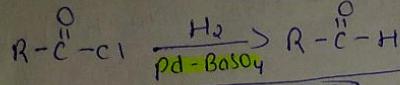


⑮ Coupling Reaction :-

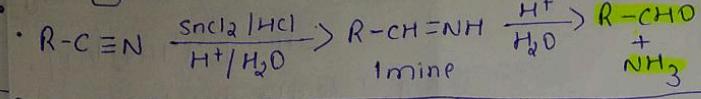


ALDEHYDE KETONE ACID CARBOXYLIC

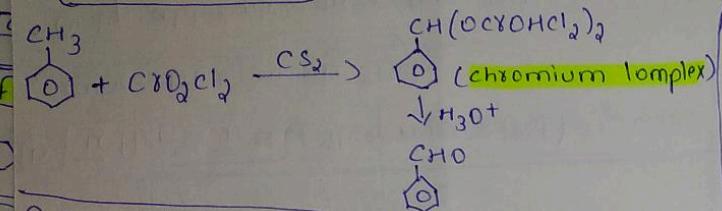
① **Rosenmund Reduction** :-



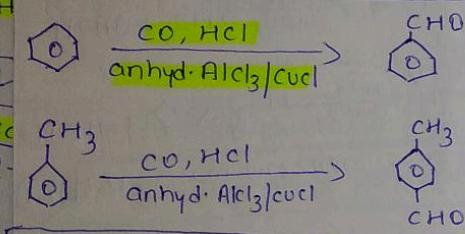
② **Stephen Reduction** :-



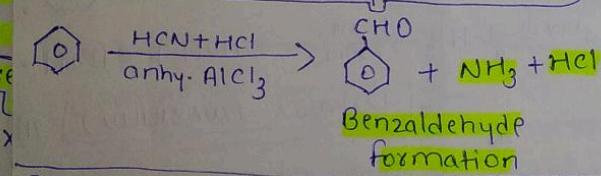
③ **Etard Reaction** :-



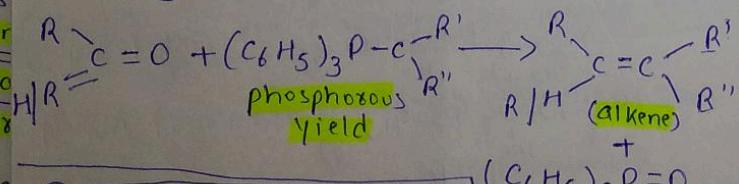
④ **Gattermann Koch Reaction** :-



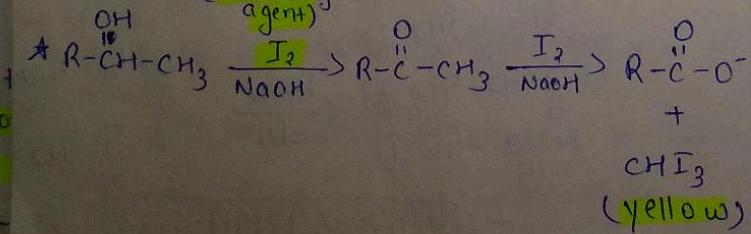
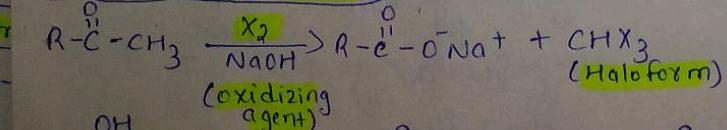
⑤ **Gattermann Aldehyde Reaction** :-



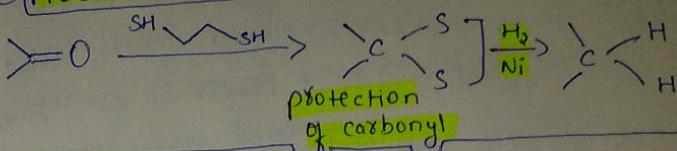
⑥ **Wittig Reaction** :-



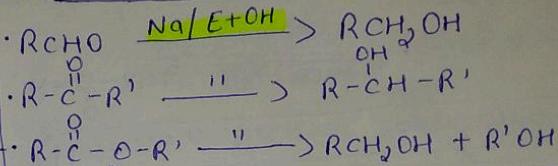
⑦ **Haloform Reaction** :-



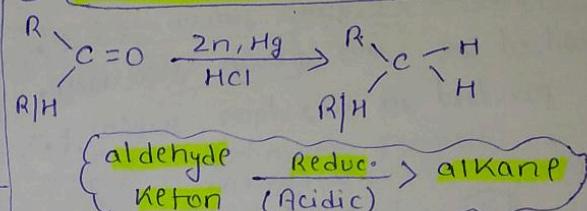
⑧ **Mozingo Reaction** :-



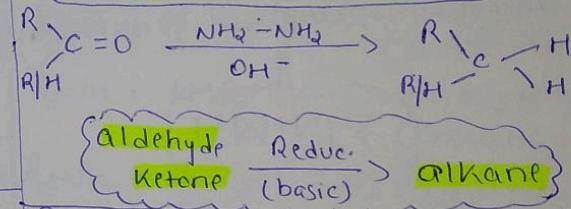
⑨ **Bouveault Blanc Reduction** :-



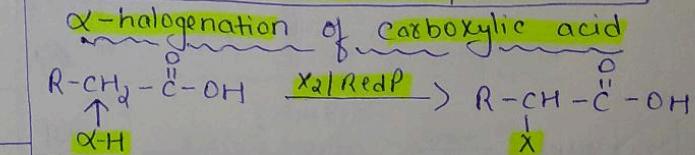
⑩ **Clemmensen Reduction** :-



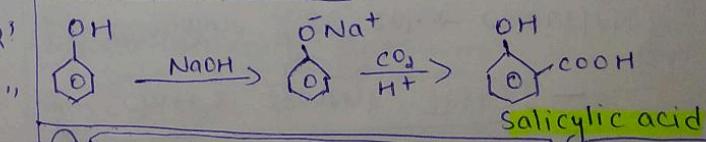
⑪ **Wolf Kishner reduction** :-



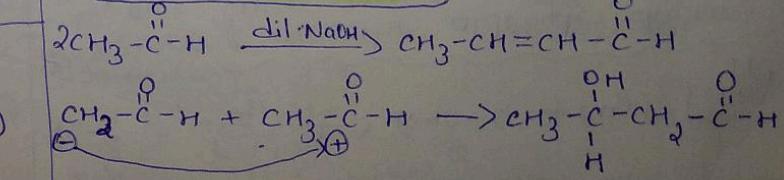
⑫ **Hell Volhard Zelinsky Reaction** :-



⑬ **Koile's Reaction** :-



⑭ **Aldel condensation** :-

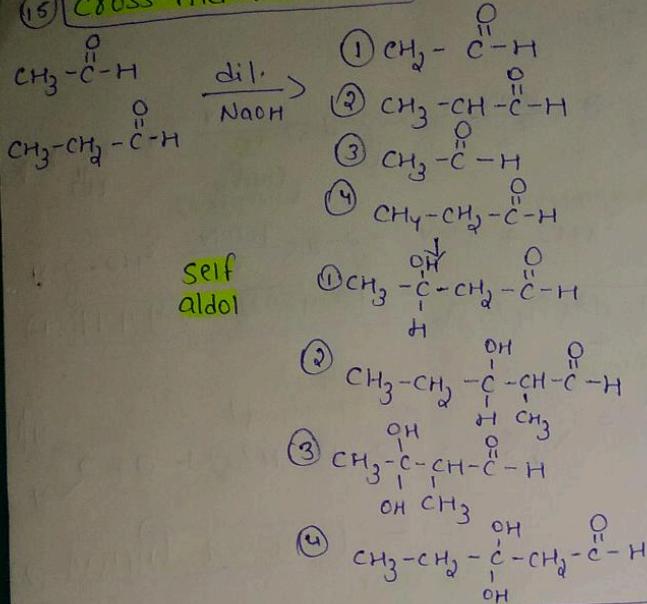


a enolate ion form

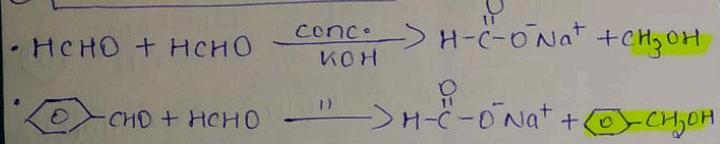
b enolate will attack on carbonyl carbon

c $\alpha\beta$ unsaturated carbonyl compound is formed.

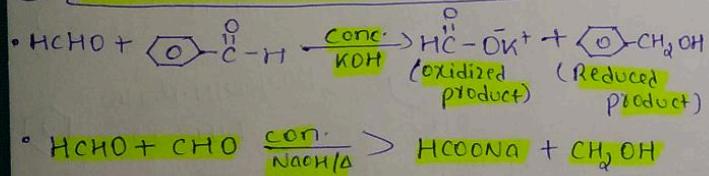
(15) Cross-Aldol reaction :-



(16) Cannizzaro reaction :-



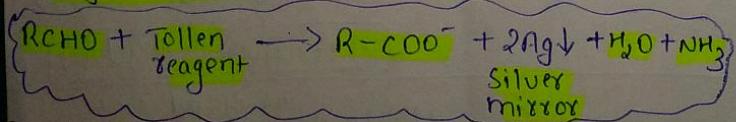
(17) Cross cannizzaro reaction :-



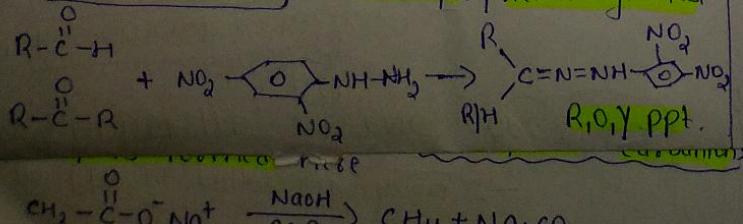
(18) Tollen's Test (silver mirror test)

Conc. HCl + anhyd. ZnCl_2

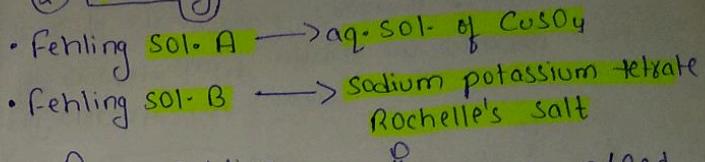
- Only aldehydes gives this test
- Ammonical silver nitrate
- $[\text{Ag}(\text{NH}_3)_2]^+ \text{OH}^-$



(19) 2,4-DNP Test :- Aldehyde / Ketone give test



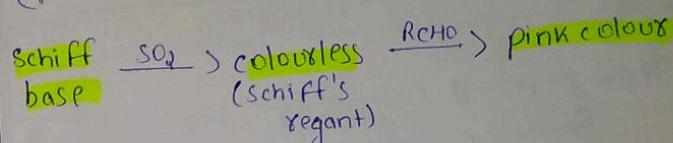
(20) Fehling solution :-



* Ketone & aromatic aldehyde do not give this test.

(21) Schiff's reagent test :-

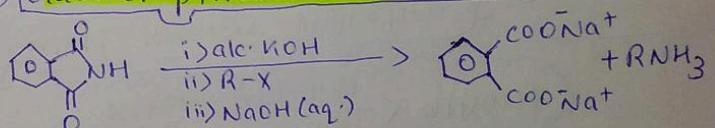
(p-rosaldehyde & SO) sol. \leftarrow colourless



- Ketone don't give this test
- Both aliphatic & aromatic aldehyde give R'

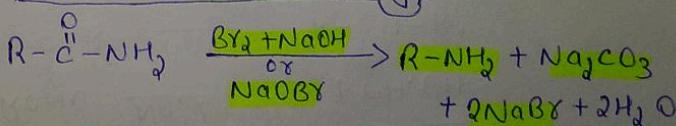
AMINES

(1) Gabriel phthalimide reaction :-



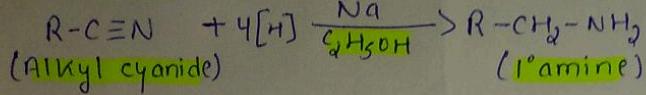
- 1° amine only can be prepared
- Aromatic amine can't be prepared
- 2° & 3° amine can't be prepared
- Pure aliphatic 1° amine obtained

(2) Hoffmann Bromide Degradation Reaction

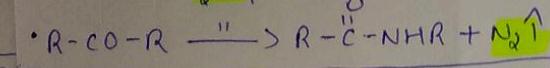
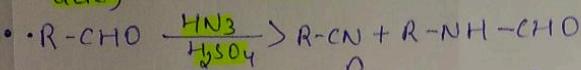
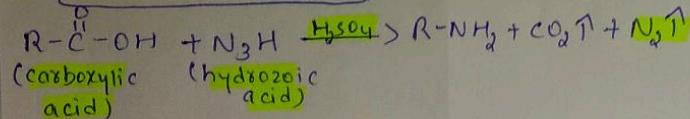


- 1° amine formed with one carbon less than the product
- 4 mole of NaOH used per Br₂
- Aryl / Alkyl isocyanate formed as an intermediate
- Migration of alkyl / aryl group from carbonyl carbon amide to nitrogen.

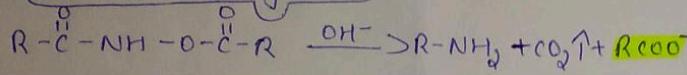
③ [Mendius reaction] :-



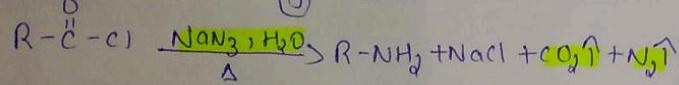
④ [Schmidt reaction] :-



⑤ [Lossen rearrangement] :-

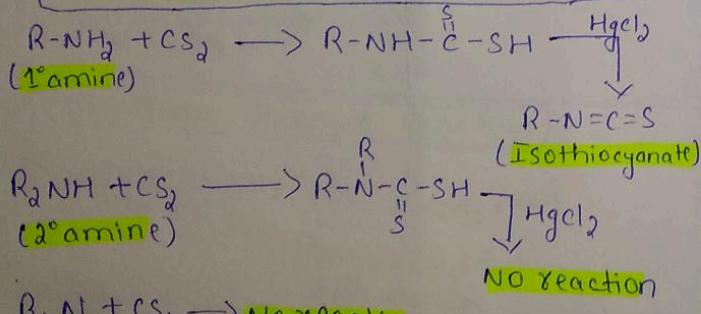


⑥ [Curtius rearrangement] :-

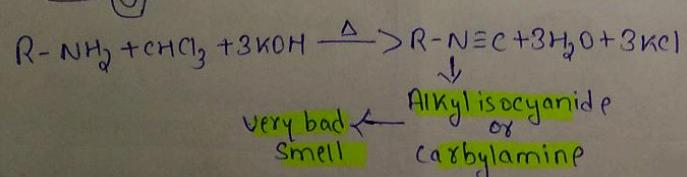


* Intermediate \rightarrow isocyanate

⑦ [Hoffmann Mustard Oil reaction/test]

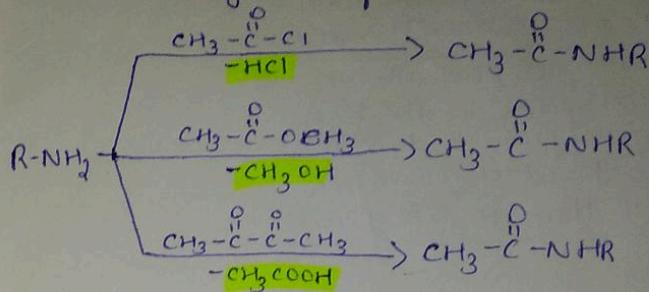


⑧ [Carbylamine reaction (Iso-cyanide test)]

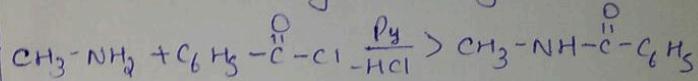


- Both aliphatic & aromatic primary amine give this test.
- Used to distinguish 1° amine from 2° & 3° amine
- 2° & 3° amine don't respond to this test.
- Intermediate is dichloro carbon

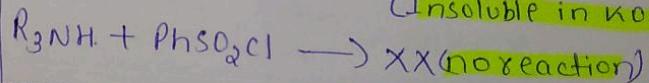
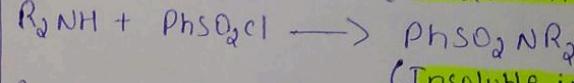
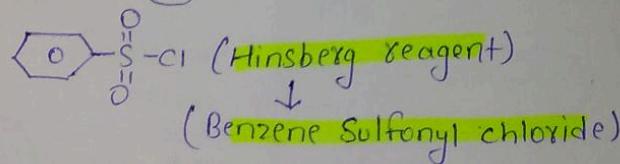
⑨ [Schotten Baumann Reaction] :- (Acylation of amine)



• 3° amine don't give acylation reaction

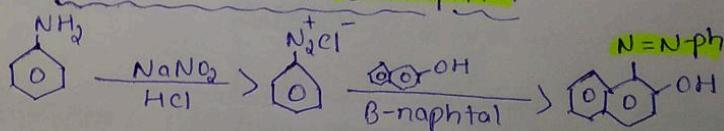


⑩ [Heisbergs test] :-

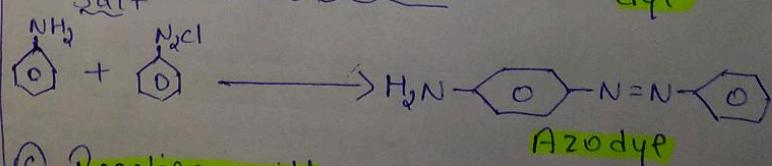


⑪ [Coupling reaction] :-

a. Reaction with B-Naphthal



b. Reaction with Diazonium Salt



c. Reaction with Benzaldehyde

