Nitro-compound

- $R-NO_2$ → Nitroalkane
- $Ph-NO_2$ → nitrobenzene
- $R-O-N=O$ → Alkyl nitrite

Preparation

① From Haloalkane

→ $R-X \xrightarrow{Ag-NO_2} R-NO_2 + AgX$
nitroalkane.

→ $R-X \xrightarrow{K-NO_2} R-O-N=O + KX$.
alkyl nitrite

② From alkane (Nitration of alkane)

→ Free radical mechanism. (vapour phase rxn).

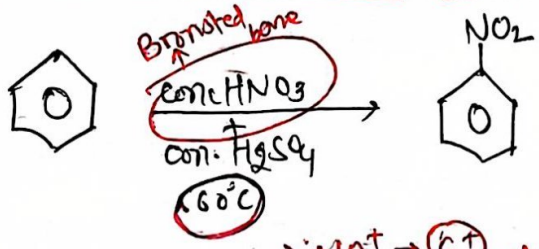
$R-H \xrightarrow[HNO_3]{\text{fuming, } 450-500^\circ C} R-NO_2$.
($HNO_2 + NO_2$)

eg. $CH_4 \xrightarrow[HNO_3]{\text{fuming}} CH_3-NO_2$

$C-C \xrightarrow[HNO_3]{\text{fuming}} C-C-NO_2 + C-NO_2$

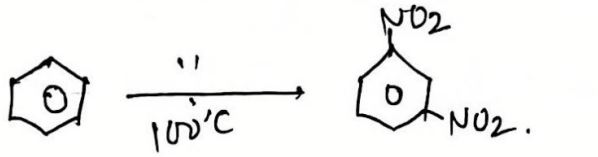
$C-C-C \xrightarrow[HNO_3]{\text{fuming}} C-C-C-NO_2 + C-\underset{NO_2}{\overset{|}{C}}-C + C-NO_2 + C-C-N$

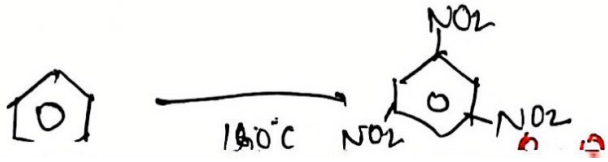
③ Nitration of benzene (Imp) → E.S.R



→ NO_2^+ → E^+ - electrophile.

but





Scanned with CamScanner

Chemical properties

① Halogenation

$CH_3-NO_2 \xrightarrow[NaOH]{Cl_2} CCl_3NO_2$

Nitrochloroform or chloropicrin

② Hydrolysis

(i) 1° nitro compound

$CH_3-CH_2-NO_2 + H_2O \xrightarrow{H^+} CH_3-COOH + NH_2OH$

C. acid.

(ii) 2° nitro compound.

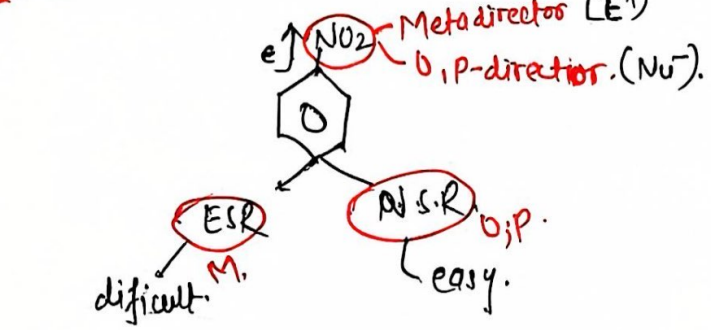
$CH_3-\underset{CH_3}{CH}-NO_2 + H_2O \xrightarrow{H^+} CH_3-\overset{O}{\overset{\|}{C}}-CH_3 + N_2O$

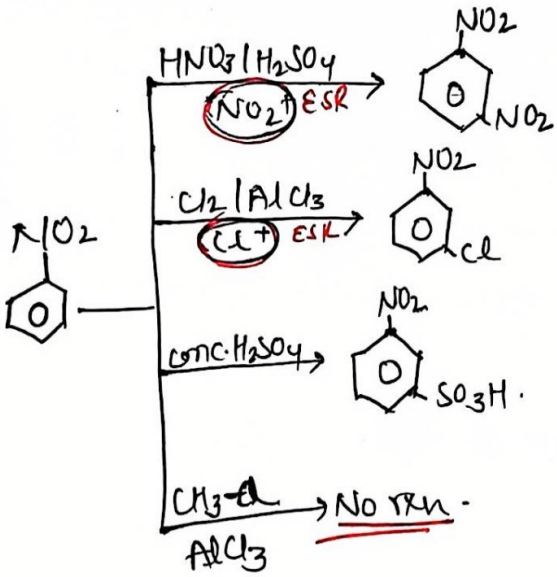
Ketone. Nitrous oxide.

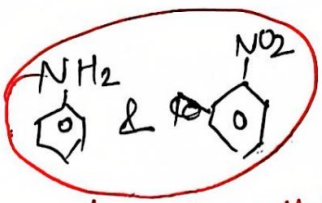
(iii) 3° nitro compound

$CH_3-\underset{CH_3}{\overset{CH_3}{C}}-NO_2 \xrightarrow[H^+]{H_2O} X.$

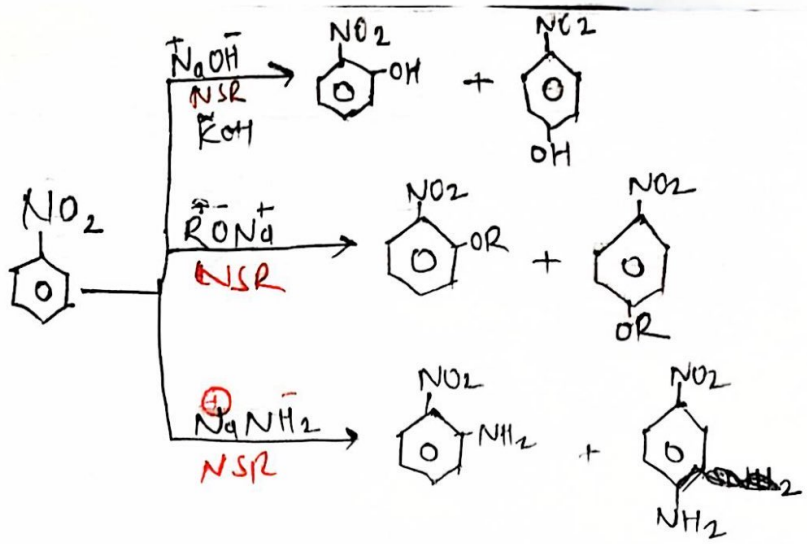
③ Reaction with HONO → studied







↳ No F.C. alkylation & F.C. acylation.



Reduction (V. Imp)

→ $-\underset{\underset{O}{\downarrow}}{N}=O \xrightarrow[-2H_2O]{2H} -\overset{H}{N}=\overset{H}{O}$ (nitroso) $\xrightarrow{2H}$ $-NH-OH$ substituted Hydroxyl amine $\xrightarrow{2H}$ $-NH_2 + H_2O$

2H use हुन्छ
6H चाहिन्छ
र 2 वटा H_2O Release.

① Reaction in acidic medium

R.A → Sn/HCl, Zn/HCl, Fe/HCl.

$$R/Ar-NO_2 \xrightarrow[6H]{metal/HCl} R/Ar-NH_2 + 2H_2O$$

e.g. $CH_3-NO_2 \xrightarrow{Sn/HCl} CH_3-NH_2 + 2H_2O$.

② Reaction in neutral medium

→ Hydroxyl amine.

R.A → Zn dust / aq. NH_4Cl.
Zn dust / H_2O
Ag-Hg couple / H_2O

$$R/Ar-NO_2 \xrightarrow[\text{''}]{+[4H]\ \text{''}} R/Ar-NH-OH + H_2O.$$

Scanned with CamScanner

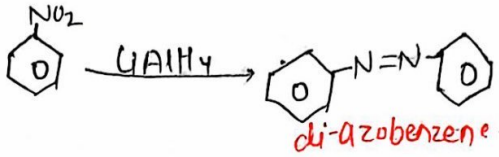
③ Catalytic reduction

H_2/Ni, H_2/Pt, H_2/Pd → amine

$R/Ar-NO_2 \xrightarrow{Ni/Pt/Pd + H_2} R-NH_2$

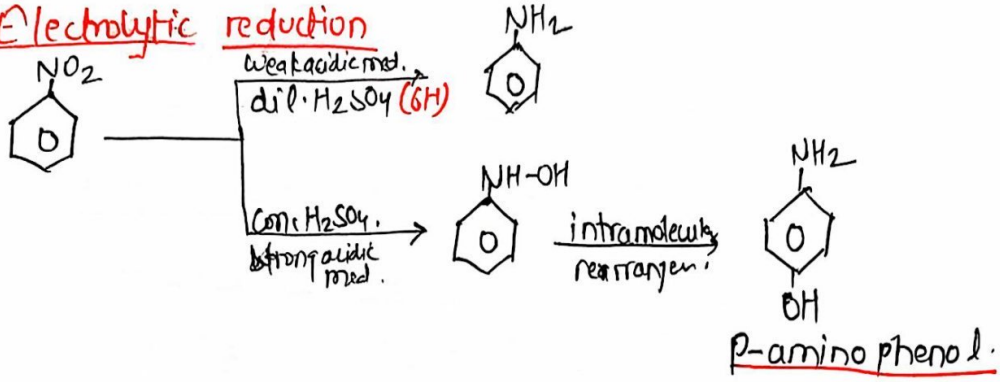
rxn with LiAlH4

$R-NO_2 \xrightarrow{LiAlH_4} R-NH_2$



di-azobenzene

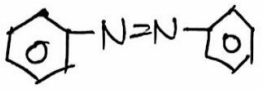
④ Electrolytic reduction



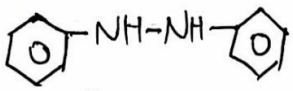
p-amino phenol.

⑤ Basic medium → Bimolecular rxn

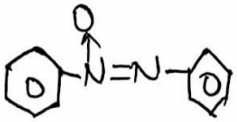
– condensed product.



– Azobenzene.



→ Hydrazobenzene.



→ Azoxybenzene.

