NITROGEN CONTAINING COMPOUNDS : NITRO BENZENE

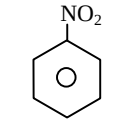
ORGANIC CHEMISTRY –II

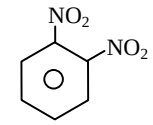
5. NITROGEN CONTAINING COMPOUNDS

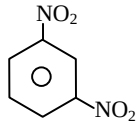
- NO_2 and – ONO are isomeric forms

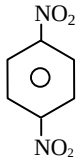
$R – NO_2$	R – ONO
Nitro alkane	Alkyl nitrite
$CH_3 – NO_2$	$CH_3 – ONO$
Nitro methane	Methyl nitrite
$CH_3 – CH_2 – CH_2 – NO_2$	$CH_3–CH_2–CH_2–ONO$
1 – Nitro propane	Propyl – 1- nitrite
$CH_3 – CH(NO_2) – CH_3$	$CH_3 – CH(ONO) – CH_3$
2- Nitro propane	Propyl – 2-nitrite

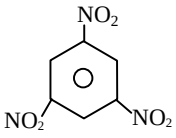
- Nitroalkane and alkyl nitrites are functional isomers.
- Naming of Nitro arenes :

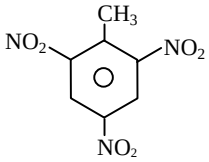

Nitrobenzene

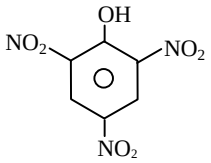

O-dinitro benzene


m-dinitro benzene


P – dinitrobenzene


1,3,5-trinitro benzene(TNB)

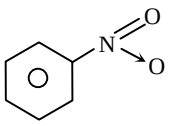

2,4, 6 – trinitrotoluene (TNT)


2,4, 6 – trinitrophenol (TNP)

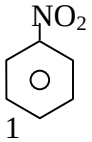
NITRO BENZENE :

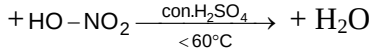
Formula : $C_6H_5 – NO_2$

Structure :



- Common name : Oil of mirbane
- **Preparation :** Benzene is heated with the mixture of conc. HNO_3 and conc. H_4SO_4 at about 60°C to give nitro benzene.
- In the nitration mixture con.HNO_3 acts as base
- Con.HNO_3 will produce NO_2^+ on reaction with con. H_2SO_4.
- If temperature is more than 60°C, dinitro or trinitro benzene may be formed.



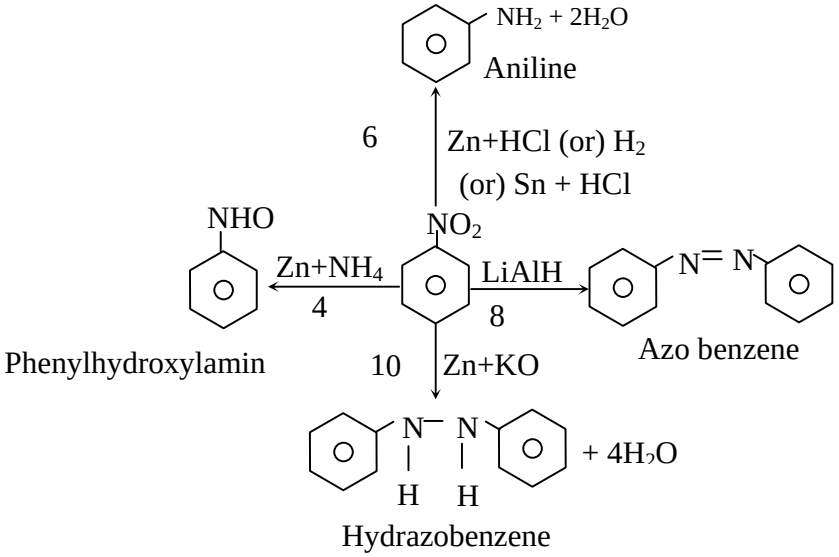


Physical properties :

- It is pale yellow oily liquid
- It has smell of bitter almonds
- It is insoluble in H_2O and soluble in organic solvent
- It is high boiling organic solvent
- It is steam volatile

CHEMICAL PROPERTIES :

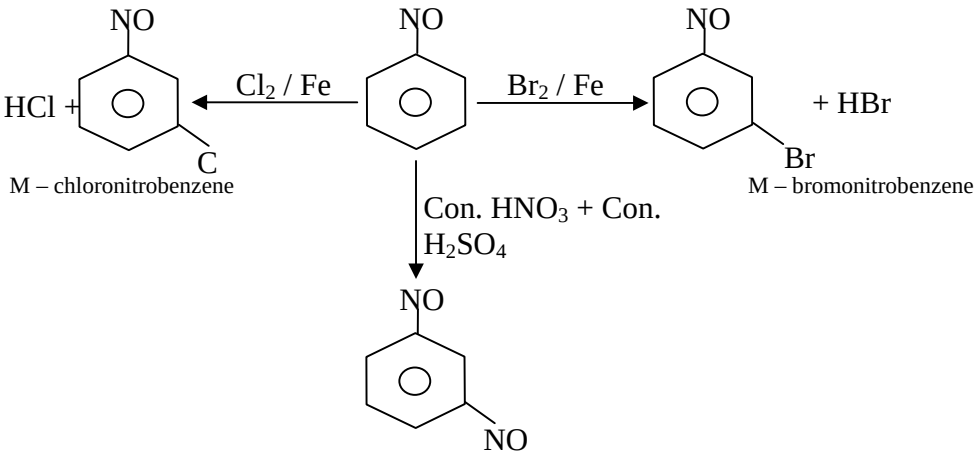
1) Reduction of nitro group of Nitro benzene :



- Nitro group on complete reduction converts to $– NH_2$ group.
- In the reduction process all others are intermediates.
- NO_2 group is highly polar and $C – NO_2$ bond is very strong and it cannot be replaced by groups like
  $– OH, – NH_2$ etc.

2) Reactions of benzene ring of nitro benzene :

- $–NO_2$ group is meta director and ring deactivator. NO_2 group withdraws electron density from benzene and deactivates the benzene of nitrobenzene. It is less reactive than pure benzene towards electrophilic substitutions
- It undergoes halogenation and nitration only



Uses of nitrobenzene :

- In the preparation of floor polishes
- As solvent
- As oxidising agent
- In perfumes under the name of oil of mirbane
- In dyes and explosives

Source : http://ciseche10.files.wordpress.com/2013/12/14-organic-compounds-containing-nitrogen.pdf