

CONCEPT MAP

ORGANIC COMPOUNDS CONTAINING NITROGEN

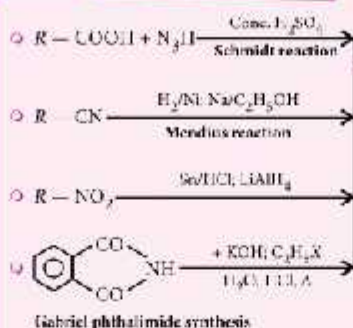
Amines



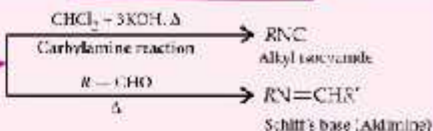
Common name: Alkylamines
IUPAC name: Alkanamines



Preparation



Chemical Properties



Basic Nature

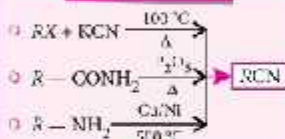
- Aliphatic amine > NH_3 > aromatic amine
- $3^\circ > 2^\circ > 1^\circ > NH_3$ [in gas phase or in non aq. solvent]
- $2^\circ > 1^\circ > 3^\circ > NH_3$ [in aq. phase only - CH_3 subs. amine]
- $2^\circ > 3^\circ > 1^\circ > NH_3$ [in aq. phase only - C_2H_5 subs. amine]

Cyanides

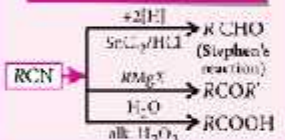


Common name: Alkyl cyanides
IUPAC name: Alkane nitriles

Preparation



Chemical Properties



Special Hofmann Reactions

- Hofmann's method (Separation of 1^o, 2^o and 3^o amines):
Diethylxalate + 1^o - 2^o - 3^o amines
→ Oxamide, solid (1^o amine)
→ Oxamic ester, liquid (2^o amine)
→ No reaction (3^o amine)
- Hofmann's ammonolysis (Mix. of amines is formed): $RX + NH_3 \rightarrow 1^\circ, 2^\circ, 3^\circ + 4^\circ$ amines
- Hofmann's bromamide/degradation (Only 1^o amine is formed):
 $R-CONH_2 + Br_2 + 4KOH \rightarrow R-NH_2 + 2KBr + K_2CO_3 + 2H_2O$
- Hofmann's mustard oil reaction (Test for only 1^o amine):
 $R-NH_2 + CS_2 + HgCl_2 \xrightarrow{\Delta} R-N=C=S + HgS + 2HCl$ (Alkyl isothiocyanate)

Distinction Tests

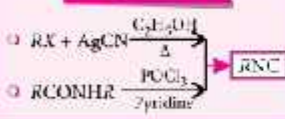
- Liebermann's nitroso test:
HONO + 1^o + 2^o + 3^o amines
→ $R-OH + N_2 \uparrow + H_2O$ [For 1^o amine] (Exception - CH_3NH_2 forms methyl nitrite or dimethyl ether)
→ $R_2NNO + H_2O$ [For 2^o amine] (N-Nitroso dialkylamine (yellow oily liquid))
→ $[R_2NH]^+ NO_2^- \xrightarrow{\Delta} R-OH + R_2NN=O$ (Nitrosamine [For 3^o amine])
- Hinsberg's test:
 $C_6H_5SO_2Cl$ + 1^o + 2^o + 3^o amines
→ Clear solution \xrightarrow{KOH} Soluble salt [For 1^o amine]
→ PP. \xrightarrow{KOH} No reaction [For 2^o amine]
→ No reaction [For 3^o amine]

Isocyanides

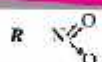


Common name: Alkyl isocyanides
IUPAC name: Alkyl carbylamines

Preparation

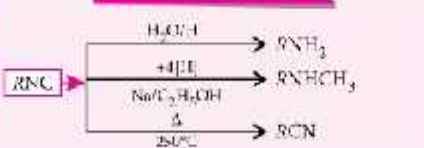


Nitro

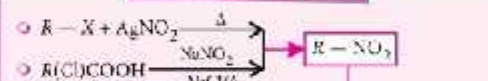


IUPAC name: Nitroalkanes

Chemical Properties



Preparation

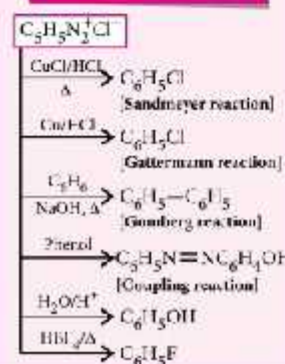


Chemical Properties



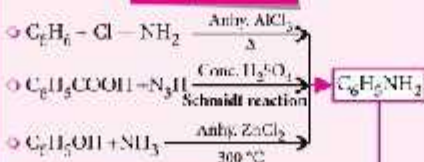
Aromatic Compounds

Diazonium Salt



Aniline

Preparation



Chemical Properties



Nitrobenzene

