

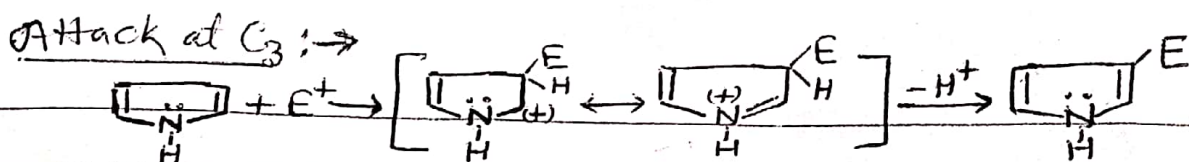
B.Sc-III,PAPER-VII (C) PYRROLE (PART-3)

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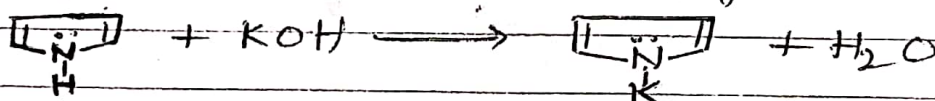
Filters

Constitution of ~~Pyro~~ Pyroole 129

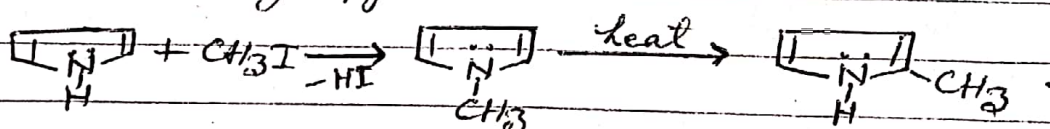


Since former intermediate is more stable so substitution at C₂ predominates. If both 2,2' or 4,4' are blocked then substitution occurs at C₃. Electrophilic substitution is carried out in other than acid medium as in acid medium pyrrole is resinified.

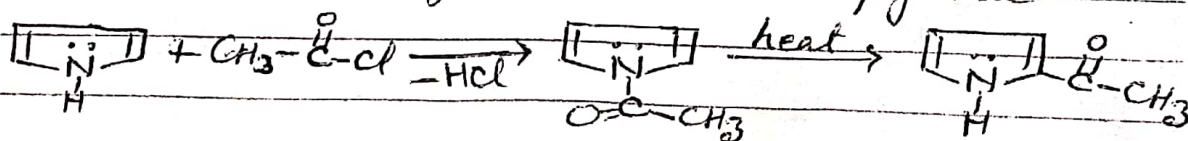
① Pyrrole reacts with KOH forming potassio pyrrole.



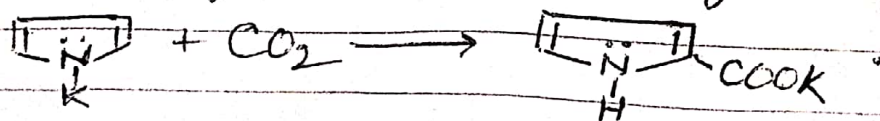
② It reacts with methyl iodide forming N-methyl pyrrole which rearranges at high temperature to 2-methyl pyrrole.



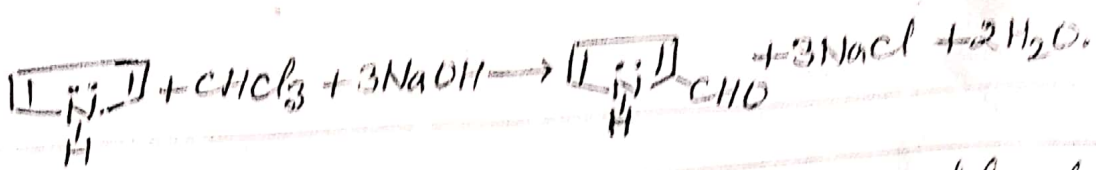
③ It reacts with acetyl chloride forming N-acetyl pyrrole which rearranges to 2-aceto pyrrole.



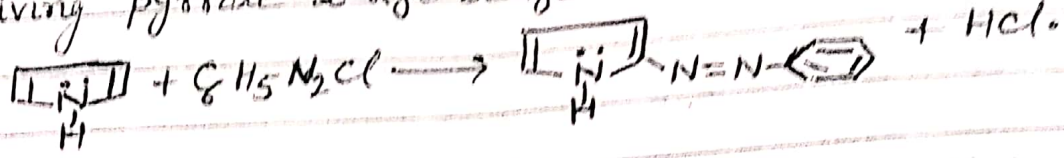
④ Kolbe's rekn: \rightarrow Potassio pyrrole reacts with CO₂ forming pyrrole-2-Carboxylate.



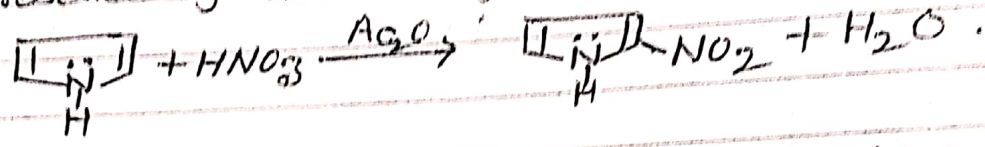
⑤ Pyrrole reacts with chloroform in presence of alkali, forming pyrrole-2-aldehyde. (Reimer-Tiemann rekn)



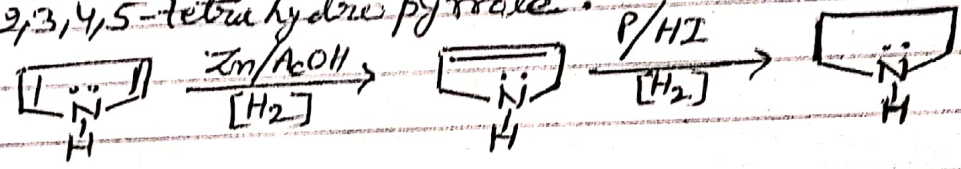
⑥ It couples with benzene diazonium chloride giving pyrrale-2-azo benzene.



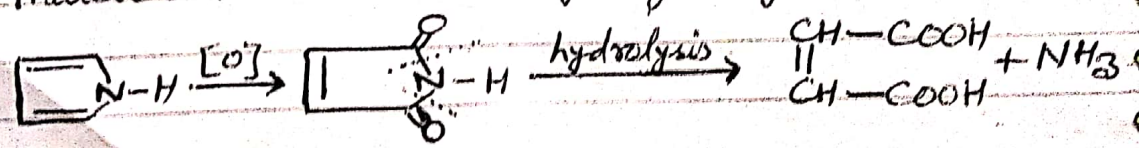
⑦ Pyrrale reacts with fuming HNO_3 acid in presence of acetic anhydride to give 2-nitro pyrrale.



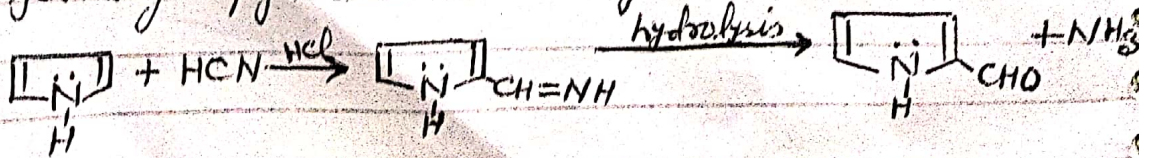
⑧ Pyrrale is reduced to first 2,5-dihydro pyrrale (pyrralidine) which on further reduction gives 2,3,4,5-tetrahydro pyrrale.



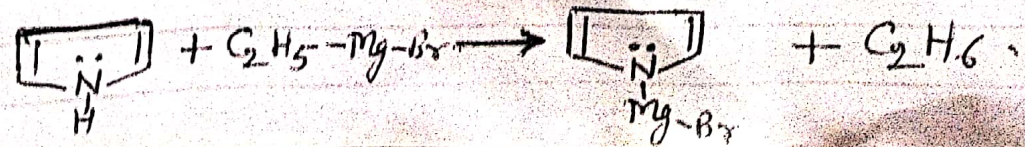
⑨ Pyrrale is oxidized by CrO_3 in AcOH to maleic imide which on hydrolysis gives maleic acid.



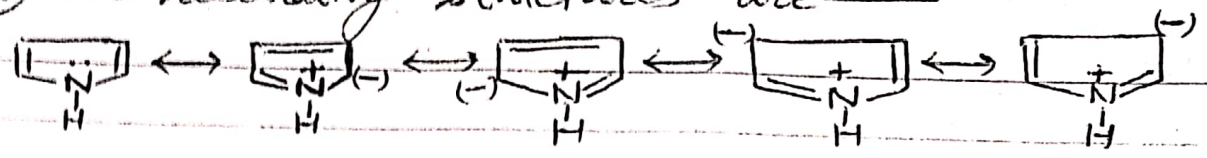
⑩ Pyrrale undergoes "Grattermann aldehyde rekt" forming pyrrale-2-aldehyde.



⑪ It reacts with ethyl magnesium bromide to give ethane.



(12) Its resonating structures are —

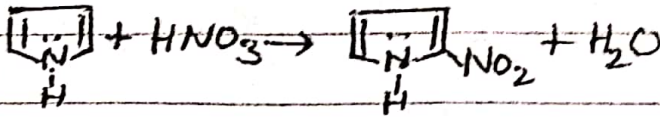


Pyrrole shows resembles in many of its property with phenol. —

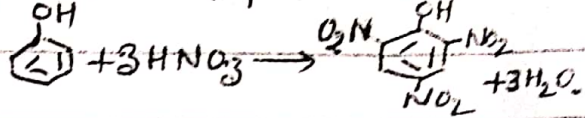
Reagent	Pyrrole	Phenol
1. KOH	It forms potassio pyrrole. $\text{Pyrrole} + \text{KOH} \rightarrow \text{Potassio pyrrole} + \text{H}_2\text{O}$	It forms potassium phenate. $\text{Phenol} + \text{KOH} \rightarrow \text{Potassium phenate} + \text{H}_2\text{O}$
2. CH ₃ I	First it forms N-methyl pyrrole which on heating rearranges to 2-methyl pyrrole. $\text{Pyrrole} + \text{CH}_3\text{I} \xrightarrow{-\text{HI}} \text{N-methyl pyrrole} \xrightarrow{\Delta} \text{2-methyl pyrrole}$	It forms anisole. $\text{Phenol} + \text{CH}_3\text{I} \rightarrow \text{Anisole} + \text{NaI}$
3. CH ₃ COCl	First it forms N-acetyl pyrrole which rearranges to 2-acetyl pyrrole. $\text{Pyrrole} + \text{CH}_3\text{COCl} \rightarrow \text{N-acetyl pyrrole} \rightarrow \text{2-acetyl pyrrole}$	It forms phenyl acetate. $\text{Phenol} + \text{CH}_3\text{COCl} \rightarrow \text{Phenyl acetate} + \text{HCl}$
4. CO ₂ (Kolbe's rxn)	Potassio pyrrole with CO ₂ gives Pyrrole-2-Carboxylate. $\text{Potassio pyrrole} + \text{CO}_2 \rightarrow \text{Pyrrole-2-Carboxylate}$	It gives potassium salicylate. $\text{Potassium phenate} + \text{CO}_2 \rightarrow \text{Potassium salicylate}$
5. CHCl ₃ + KOH (Reimer-Tiemann rxn)	It forms pyrrole-2-aldehyde. $\text{Pyrrole} + \text{CHCl}_3 + \text{KOH} \rightarrow \text{Pyrrole-2-aldehyde} + 3\text{KCl} + 2\text{H}_2\text{O}$	It forms salicylaldehyde. $\text{Potassium phenate} + \text{CHCl}_3 + 3\text{KOH} \rightarrow \text{Salicylaldehyde} + 3\text{KCl} + 2\text{H}_2\text{O}$
6. C ₆ H ₅ N ₂ Cl (Coupling rxn)	It couples forming pyrrole-2-azo benzene. $\text{Pyrrole} + \text{C}_6\text{H}_5\text{N}_2\text{Cl} \rightarrow \text{Pyrrole-2-azo benzene} + \text{HCl}$	It couples forming p-hydroxy azo benzene. $\text{Potassium phenate} + \text{C}_6\text{H}_5\text{N}_2\text{Cl} \rightarrow \text{p-hydroxy azo benzene} + \text{HCl}$

7. Nitration

It forms 2-nitro pyrrole.

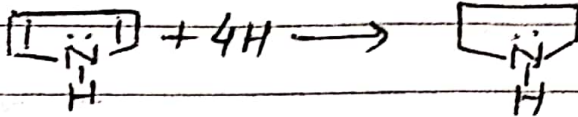


It gives picenic acid.

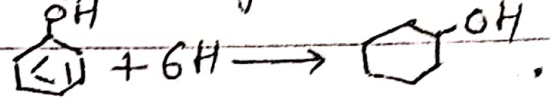


8. Reduction

It forms tetrahydro pyrrole.

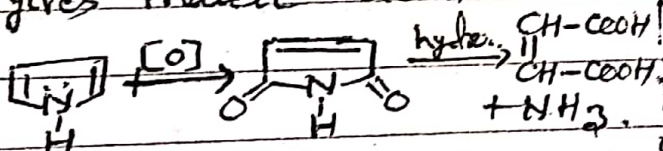


It forms cyclohexanol.

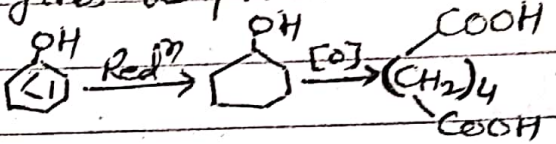


9. Oxidation

Pyrrole on oxidation with CrO_3 in AcOH gives maleic-imide which on hydrolysis gives maleic acid.

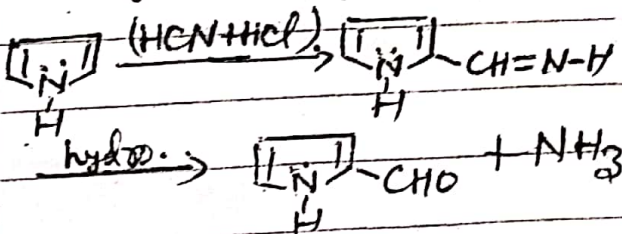


Phenol on reduction followed by oxidation gives adipic acid.

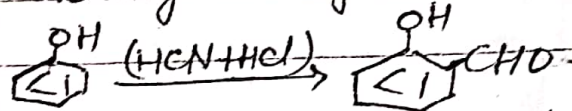


10. Gattermann aldehyde rxnⁿ (HCN+HCl)

It gives pyrrole-2-aldehyde.

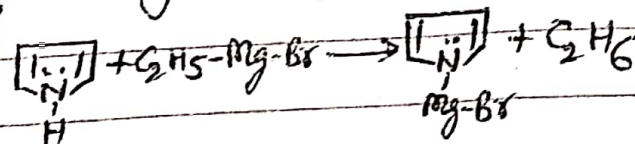


Phenol gives salicylaldehyde.

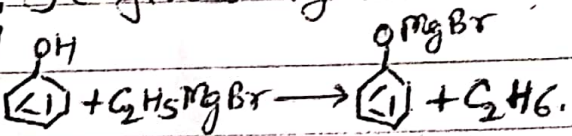


11. Grignard reagent ($\text{C}_2\text{H}_5\text{-Mg-Br}$)

It gives hydrocarbon.



It gives hydrocarbon.



12. Resonance

