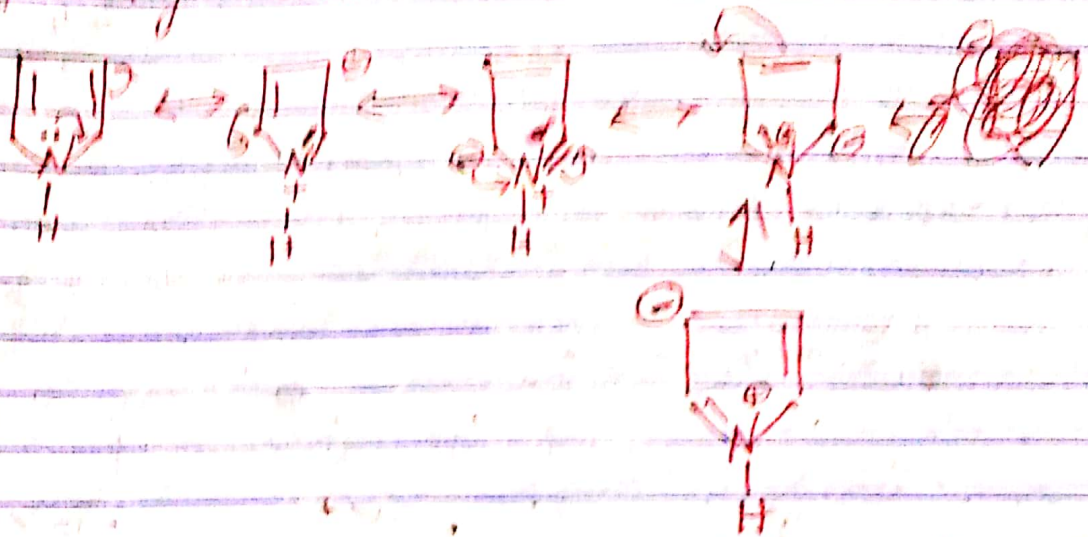


## Chemical Reactions of ~~Pyrolytic~~ Pyrolic

(i) Resonance structure - Pyrolic is resonance hybrid of following resonance structures.

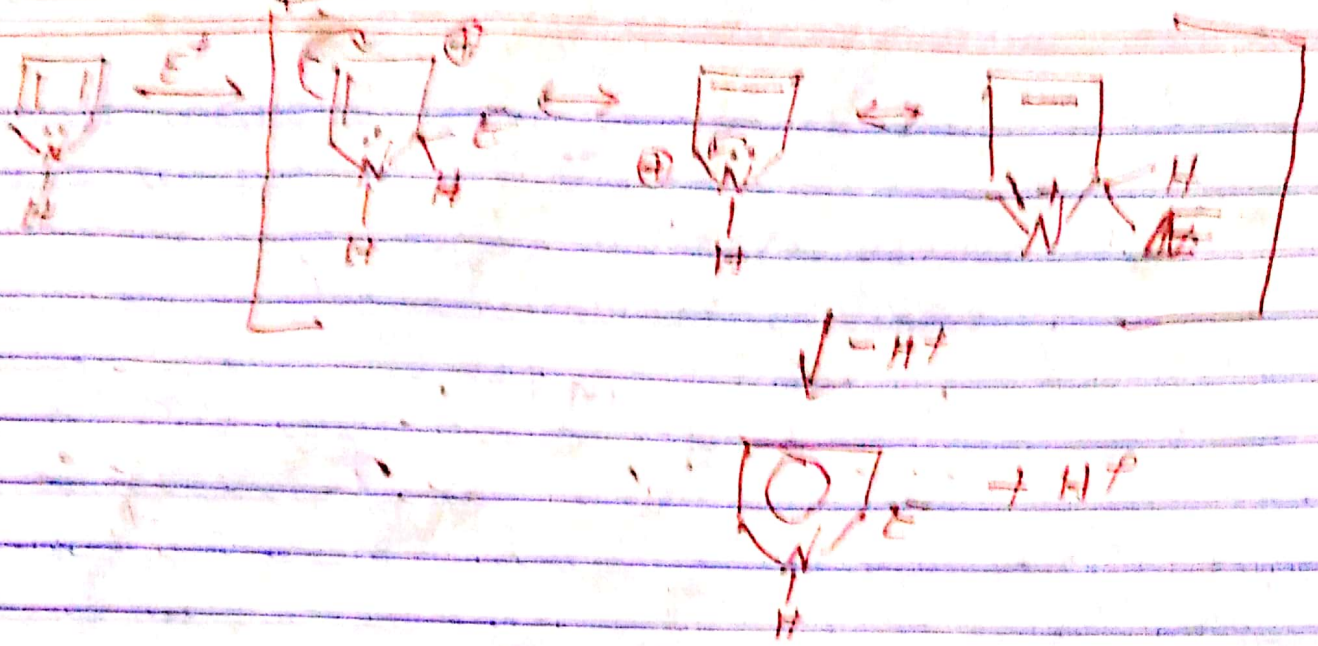


It is observed that the  $C-N$  bond is shorter than a normal  $C-N$  single bond, seems to possess significant double bond character. As pyrolic is aromatic ring and it has rich electron density, thus it enables pyrolic to participate in electrophilic substitution.

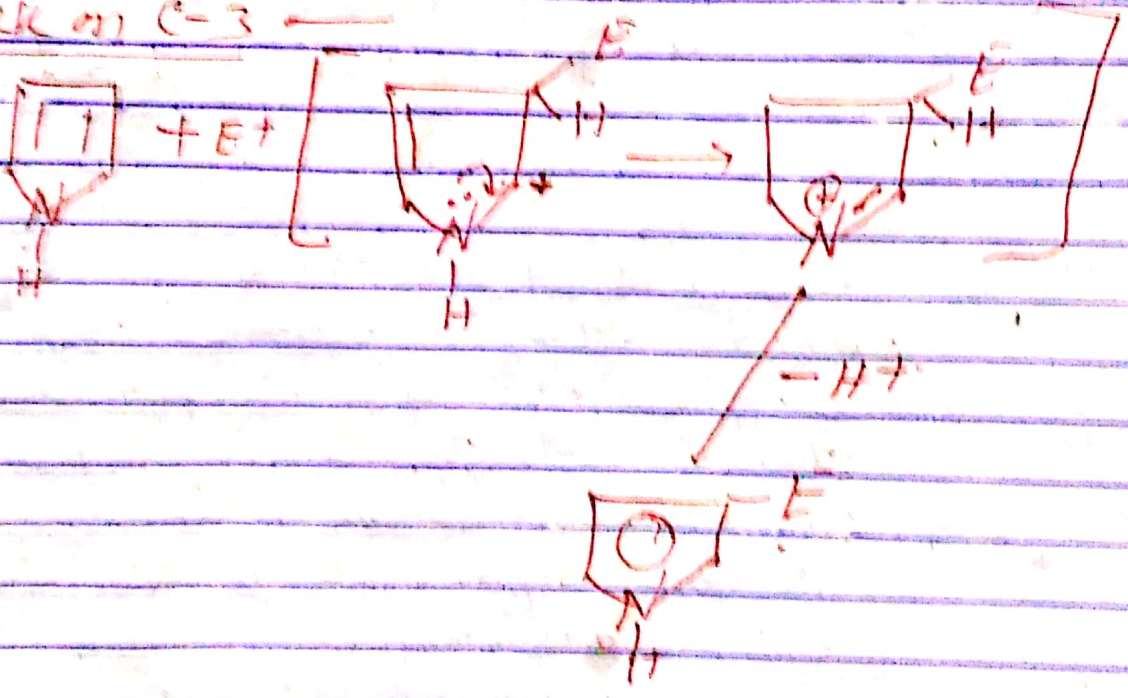
(2) Electrophilic substitution:- electrophilic substitution occurs at  $C-2$  because it has three stable intermediate while electrophilic substitution at  $C-2$  has only 2 stable intermediate. substitution occurs on  $C-3$  only when  $C-2$  position is blocked.

(2)

Attack on C-2

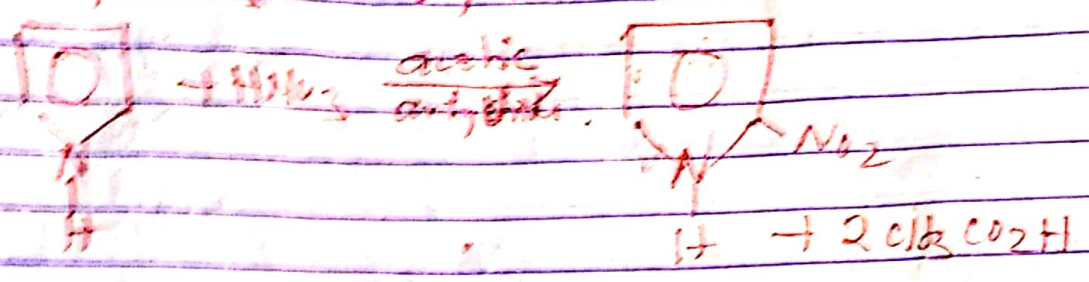


Attack on C-3



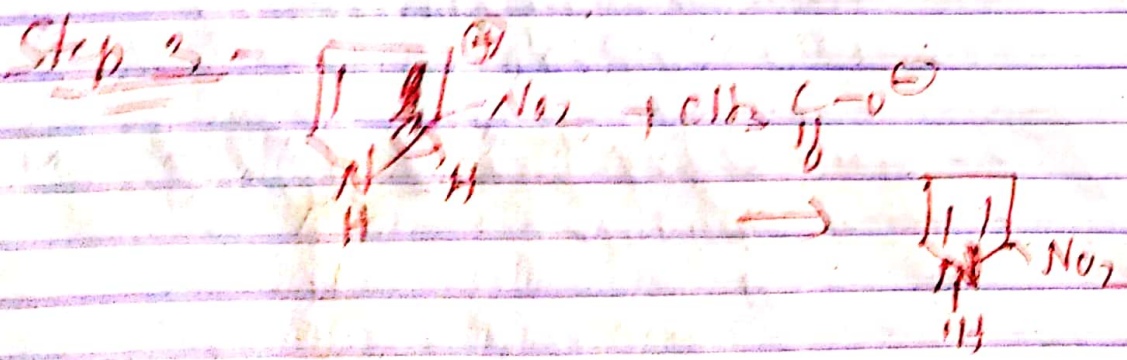
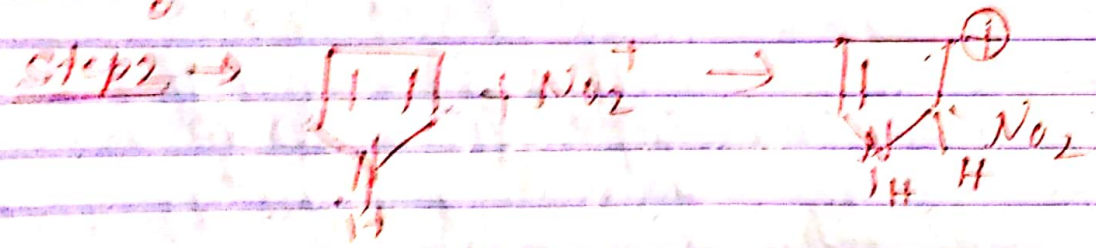
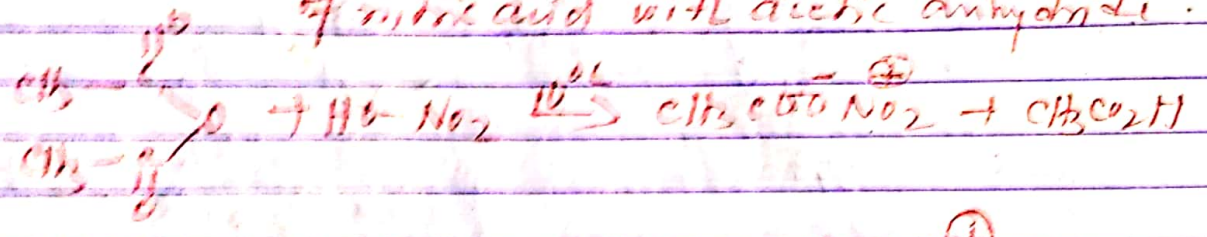
(3)

③ Nitration → In presence of acetic anhydride. Pyrrole nitrated with nitric acid to yield nitro pyrrole.

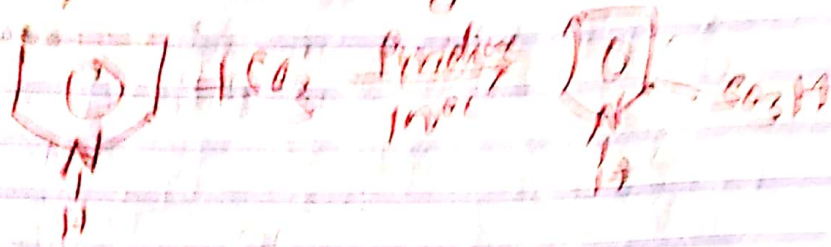


Mechanism: - It occurs in three steps.

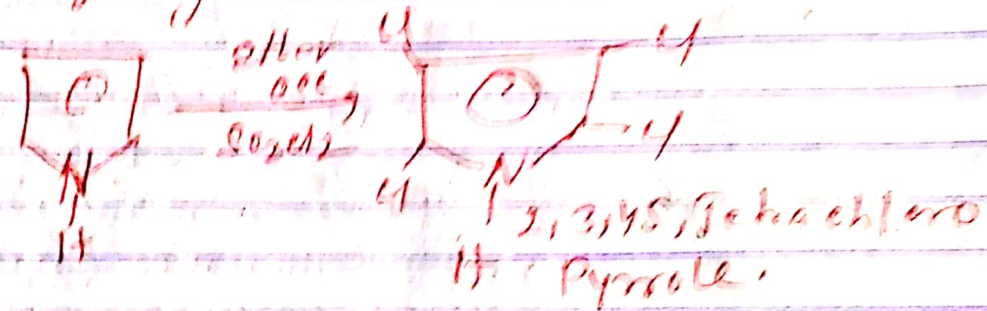
Step 1: - Electrophile is generated by action of nitric acid with acetic anhydride.



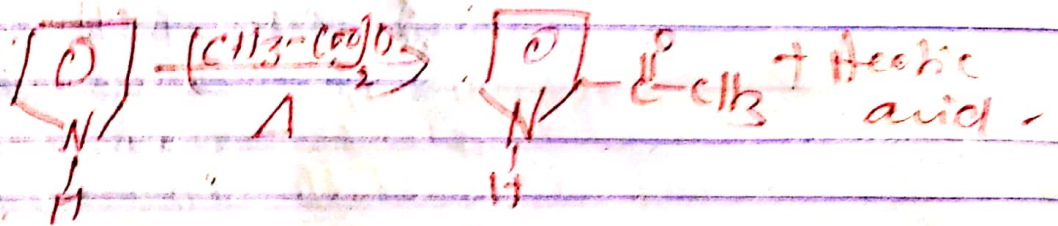
(4) Sulphonation: Sulphonation of pyrrole is performed by sulphur dioxide in presence of pyridine at high temperature.



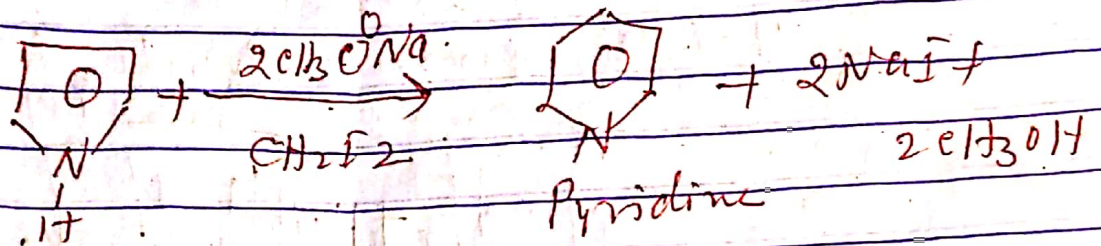
(5) Halogenation & chlorination is carried out with sulphuryl chloride in ether at  $0^\circ\text{C}$  giving rise to tetra chlorinated pyrrole.



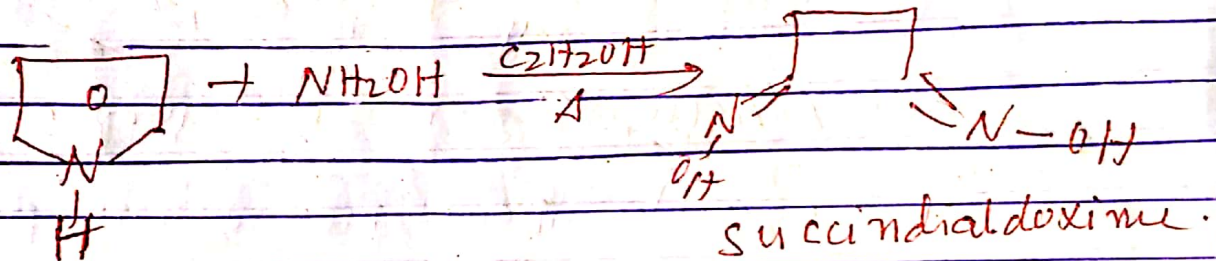
(6) Friedel craft acylation: Pyrrole reacts with acetic anhydride at  $250^\circ\text{C}$  to yield 2 acetyl pyrrole.



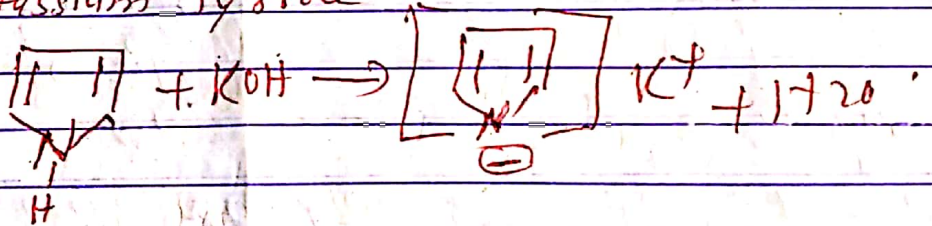
7) Ring expansion reaction -



8) Ring opening Reaction - Pyrrrole reacts with ethanolic hydroxylamine to form succindialdoxime.



9) Acid ~~character~~ character - Pyrrrole reacts with KOH to form potassium Pyrrrole.



The reason for acidic character of Pyrrrole is that the electron pair delocalization from nitrogen atom makes it positively charged and increases the possibility of proton abstraction giving Pyrrrole anions.

(10)

Basic character  $\rightarrow$  Pyrrole is also basic character because it reacts with HCl to form pyrrole hydrochloride.

