

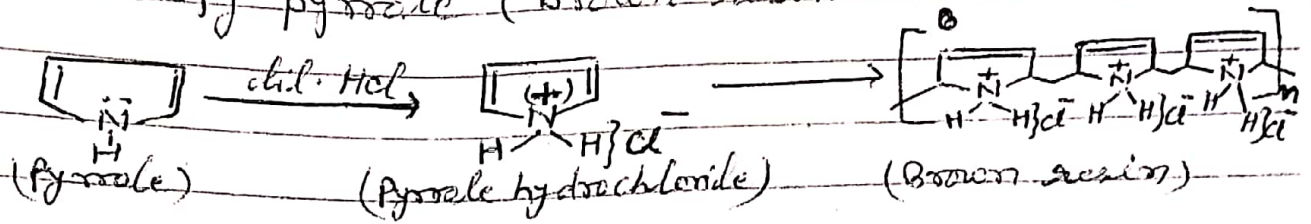
For B.Sc-III, PAPER-VII (C)

PYRROLE (part -2)

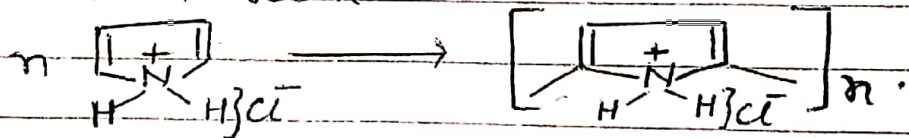
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Properties: → It is colourless liquid, B.P. -131°C .
It rapidly darkens on exposure to air. It is sparingly soluble in water but readily dissolves in ether and ethanol. It turns red, the pine splint moistened with HCl. (Test)

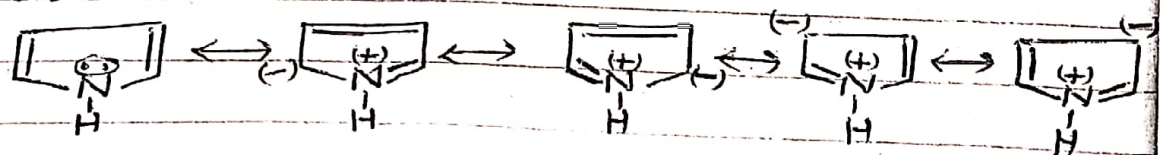
Basic Character :→ It is very weak secondary base. It forms crystalline pyrrole hydrochloride with dil. Hydrochloric acid and conc. HCl acid resinify pyrrole (brown resinous mass).



The weak basic character of pyrrole is due only to involvement of lone pair of electron on Nitrogen-atom in the formation of delocalized molecular orbital and is not available for formation of new bond with proton $[\text{Pyrrole}^+]$. If a proton is added to Nitrogen atom by reaction with an acid, the resulting structure ceases to be aromatic and resonance energy is lost, i.e., $\text{Pyrrole-H}^+\text{Cl}^-$. This makes pyrrole cation very unstable. Pyrrole cation also behaves as conjugated diene and polymerises to give brown resin.



Acidic Character :→ Pyrrole also behaves as a very weak acid. As lone pair at Nitrogen atom (N) is not free to combine with proton due to resonance of pyrrole molecule.



The p-orbital of Carbon atom contain

One electron each and the p-orbital of nitrogen contains 2 (two) electrons in the form of unhybrid. The lateral overlapping of these orbitals produces a π -molecular orbital containing six (6) electrons i.e., aromatic sextet. Pyrazole shows aromatic property arising out of π -molecular orbital which also satisfies Huckel rule $n=1$ in $4n+2$. Thus the lone pair of nitrogen becomes unavailable to combine with proton as well as shift of electron pair develops a fractional (+ve) δ^+ charge. Due to the fractional δ^+ charge produced by the shift of lone pair of electron of nitrogen in the formation of π -molecular orbital, Pyrazole is bound to show acid character. Thus it has tendency to accept electrons, that is why it behaves as weak acid.