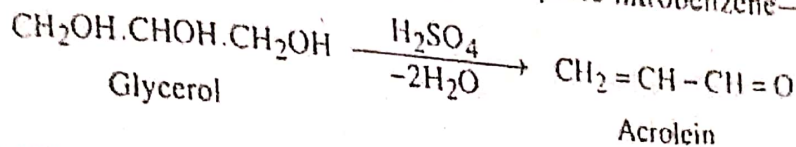
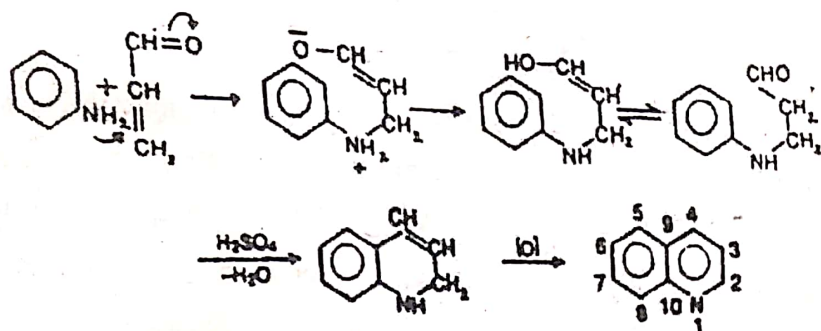


Q.29. How is quinoline obtained by Skraup synthesis?  
Or, Give the Skraup synthesis of quinoline.

Ans. : Skraup synthesis for quinoline : In this synthesis, quinoline is obtained by heating a mixture of aniline, nitrobenzene, glycerol, conc.  $H_2SO_4$  and  $FeSO_4$ . The presence of  $FeSO_4$  makes the reaction less violent. Other mild oxidising agents such as  $H_3AsO_4$  can replace nitrobenzene—

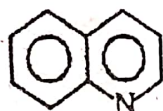


Aniline now undergoes nucleophilic 1 : 4 addition to acrolein to give  $\beta$ -phenyl aminopropionaldehyde. The side chain condenses at  $\alpha$ -position to give 1, 2-dihydro quinoline which is oxidised by nitrobenzene to quinoline and nitrobenzene is thus itself reduced to aniline—



Q.30. Quinoline is less basic than pyridine—Why?

Ans. : Quinoline has  $C_6H_4$ —substituent in addition of pyridine ring—



(Quinoline)



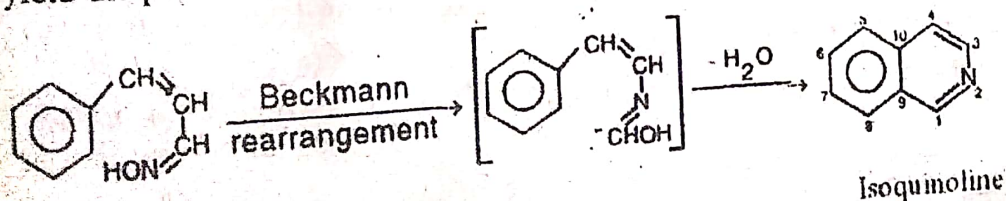
(Pyridine)

$C_6H_4$ —substituent is a weak electron withdrawing group. So it decreases the availability of lone pair on the N-atom of quinoline. Hence quinoline is less basic than pyridine.

Q.31. Give the preparation and properties of isoquinoline. Discuss its structure.

Ans. : Synthesis of isoquinoline.

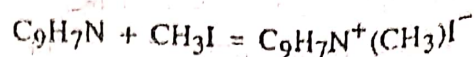
It is synthesised by heating the oxime of cinnamaldehyde with  $P_2O_5$ . The oxime undergoes Beckmann rearrangement followed by dehydration to yield the product—



Isoquinoline

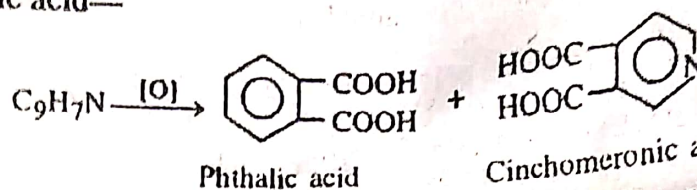
### Structure of Isoquinoline :

1. From elemental analysis and molecular weight determination, the molecular formula of isoquinoline comes  $C_9H_7N$ .
2. Since it undergoes nitration like benzene, hence its molecule must have one or more benzene rings.
3. Since it reacts with one mole of alkyl halide to form quaternary salts hence it has a tertiary N-atom—



N-methyl isoquinolinium iodide

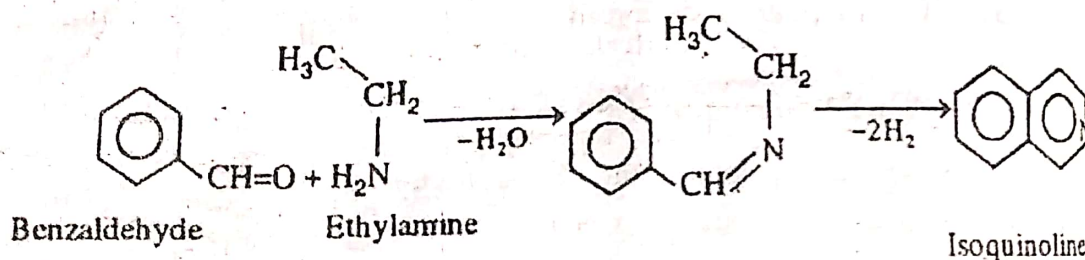
4. On oxidation with  $KMnO_4$ , it gives a mixture of phthalic acid and cinchomeric acid—



The former is formed by the decomposition of pyridine ring and the latter is formed by the decomposition of benzene ring in it. Further, its molecule has one benzene ring fused with a pyridine ring at  $\beta\gamma$ -positions. Positions of two  $-COOH$  groups in cinchomeric acid show the positions in the pyridine ring ( $\beta\gamma$ ) where it is found with the benzene ring. Hence the following structure of isoquinoline is suggested—



5. This structure is confirmed by its synthesis by condensing benzaldehyde with ethylamine and passing vapours through red hot tube—



**Q.32.** What are addition (or chain growth) and condensation (or step growth) polymerisations? Explain

**Ans. :** Polymerisations are mainly of two types—*Addition and Condensation :*

**1. Addition polymerisations** involve the self addition of normal unsaturated molecules of one or two monomers without loss of any small molecule to give