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Chemistry

SUB. CODE- BSCC2402

For B.Sc. 4th Semester

(Heterocycles)

Module-IV

Quinoline and Isoquinoline: structure elucidation

By

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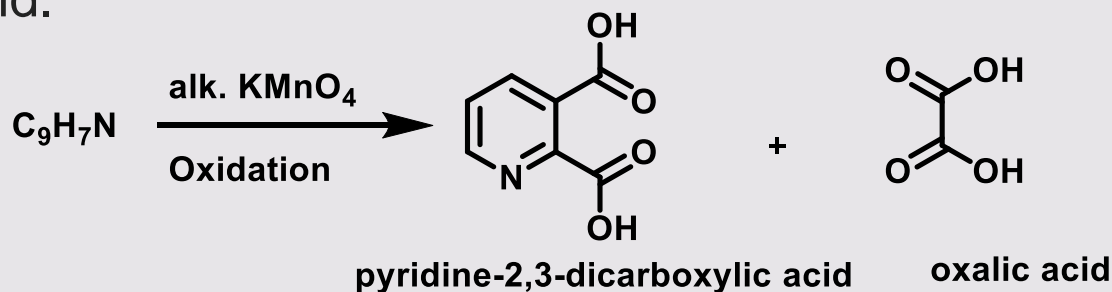


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Quinoline: structure elucidation

1. **Molecular formula** is C_9H_7N deduced from analytical and molecular weight determinations
2. It undergoes electrophilic aromatic substitution reactions like nitration, sulphonation, etc. but does not give Friedel-Craft reaction.
3. It is resistant to addition reactions.
4. On vigorous oxidation with alk. $KMnO_4$, it gives pyridine-2,3-dicarboxylic acid (quinolic acid) and oxalic acid.

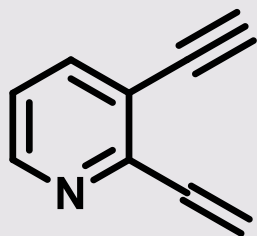




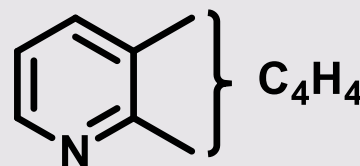
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Quinoline: structure elucidation

From the reactions, the two possible structures for quinoline are proposed as A or B



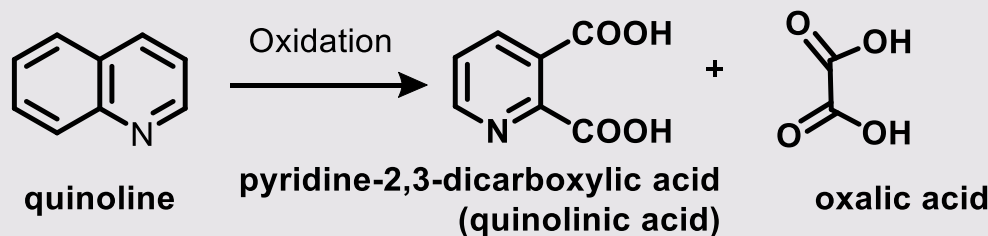
A



B

Quaternary ammonium salts are formed with alkyl halides. This suggests the presence of a tertiary N-atom in the ring.

Hence the pyridine ring should be fused with a benzene ring through a common carbon pair in quinoline.





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Isoquinoline: structure elucidation

1. **Molecular formula** is C_9H_7N deduced from analytical and molecular weight determinations
2. It undergoes electrophilic aromatic substitution reactions like nitration, sulphonation, etc. as well as nucleophilic substitution reaction similar to pyridine. This shows the presence of benzene and pyridine ring.
3. It undergoes addition reaction with only one mole of CH_3I to give quaternary ammonium salt which shows the presence of one tertiary N-atom..

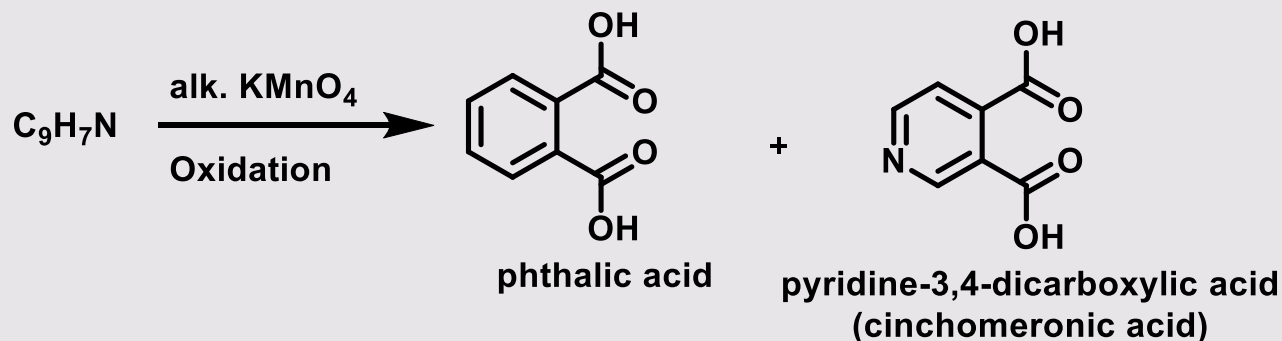


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Isoquinoline: structure elucidation

4. On oxidation with alk. KMnO_4 , it gives mixture of phthalic acid and cinchomeronic acid.



This shows the pyridine ring is not stable towards oxidation, and isoquinoline consists of one benzene ring fused with pyridine ring at 3, 4- position. Hence the structure can be proposed as



isoquinoline

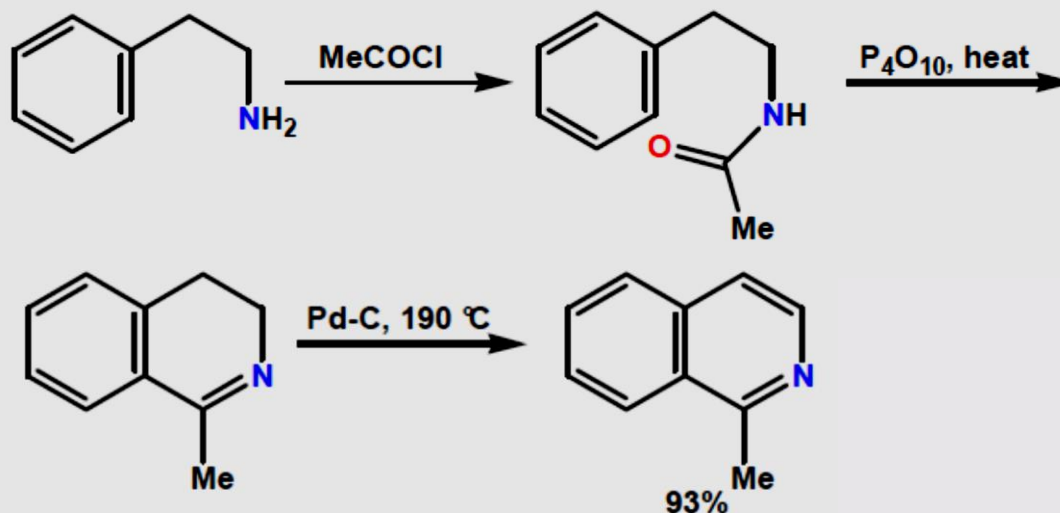


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Isoquinoline: structure elucidation

The structure is further confirmed by Bischler-Napieralski synthesis





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References

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2. **University Chemistry, Vol-IV, Dr. U. N. Dash, Dr. K. K. Ojha, Himalaya Publishing house, Unit V**