

Quadrant II – Transcript and related material

Programme: Bachelor of Science (Third Year)

Subject: Chemistry

Paper Code: CHC 107

Paper Title: Organic Chemistry

Unit: Alkaloids

Module Name: Structure elucidation of Nicotine-2 and Synthesis of Nicotine

Module No: 13

Name of the Presenter: Mrs. Pranaya Naik

Notes:

Nicotine

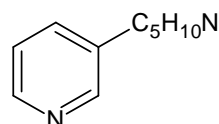
- **Tobacco alkaloid**
- It is classified under **Pyridine-Pyrrolidine** Class based on the structure

Structure Elucidation of Nicotine

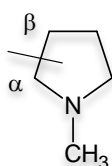
Earlier steps of structure elucidation of Nicotine gives its molecular formula $C_{10}H_{14}N_2$.

It also confirms that Nicotine structure contains

- ❑ Two nitrogen atoms, both of which are tertiary in nature
- ❑ Pyridine nucleus with a side chain ($C_5H_{10}N$) at position 3
- ❑ This side chain is a pyrrole derivative with N-methyl group



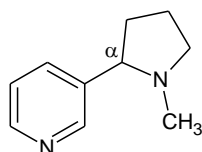
Side chain structure can be given as follows



N-methylpyrrolidine

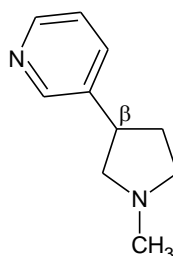
However the point of attachment of the N-methylpyrrolidine to the 3-position of pyridine ring needs to be confirmed

Hence the **two** structures for nicotine could be either



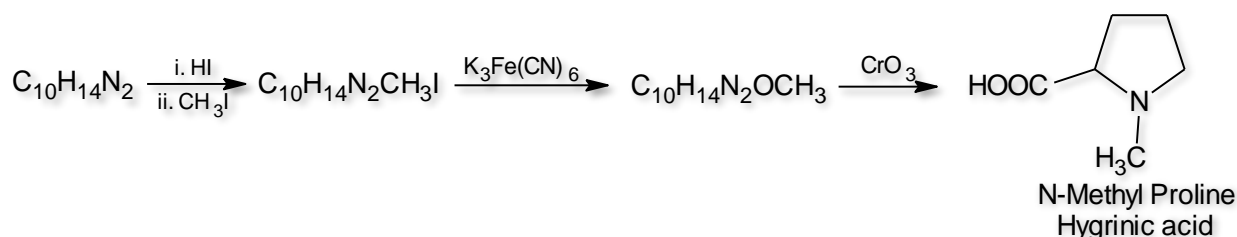
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or



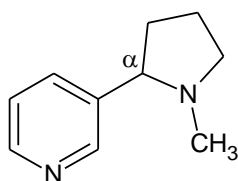
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Karrer's finding (1925,1926) gave the direct evidence for the structure of nicotine as follows.

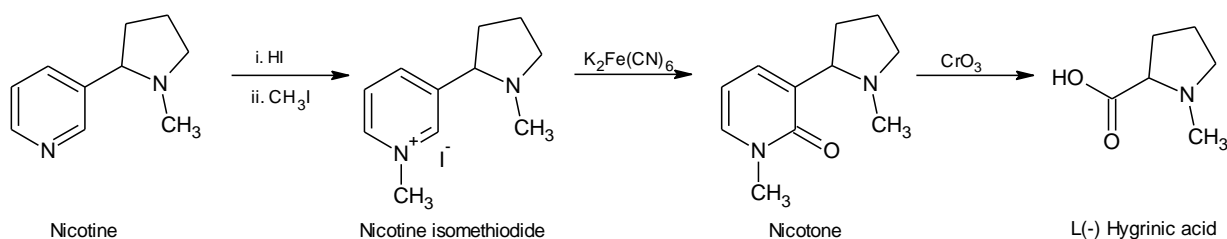


Nicotine reacts with hydroiodic acid to give nicotine hydroiodide, which forms nicotine isomethiodide when warmed with methyl iodide and this on oxidation with potassium ferricyanide, is converted into nicotine which, on oxidation with Chromium trioxide, gives hygrinic acid.

Hence the structure was found to be



Which explains the reactions as follows



Before the direct evidence by Karrer, the structure was also proposed based on the two **observations made by Pinner**

➤ i)

