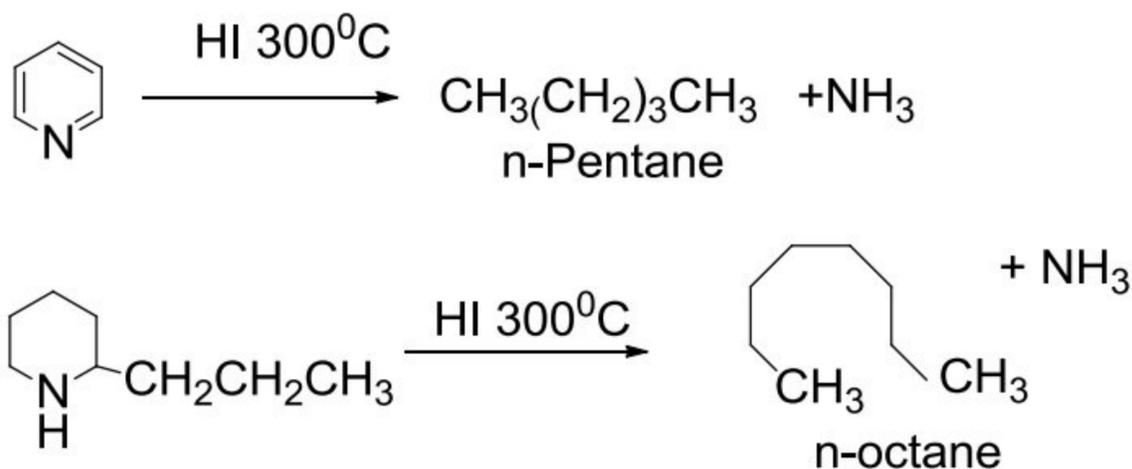


1.10 REDUCTIVE DEGRADATION:

Ring opening can take place by heating with HI at 300°C.



1.11 TROPANE ALKALOIDS-ATROPINE

1.11.1 Occurrence: Roots of deadly nightshade, Thorn apple and with l-hyoscyamine which is optically active. Atropine is the racemic form of l-hyoscyamine. It racemizes to atropine when warmed with an ethanolic solution.

1.11.2 Isolation: It is isolated from the roots of belladonna plant. The juice contains hyoscyamine, heated with K₂CO₃ it is racemized to atropine. The atropine is extracted with CHCl₃. On evaporation, the residue is treated with sulphuric acid and purified by converting it into an oxalate or a sulphate.

1.11.3 Properties:

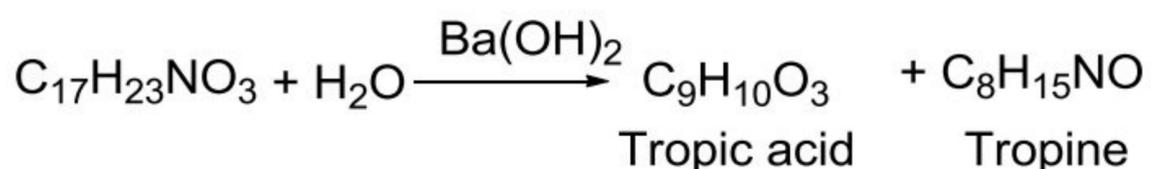
Crystalline compound (m.pt 118°C), bitter taste. It is a tertiary base with a pKa of 10.

Dilates pupil and it is used to relieve the night sweats and distressing feature of tuberculosis which diminishes the activity of salivary and gastric glands.

1.11.4 Elucidation Of Atropine:

From elemental analysis and molecular weight determination, the molecular formula of atropine is C₁₇H₂₃NO₃.

Atropine as an ester: When atropine is treated with barium hydroxide solution it undergoes hydrolysis to yield racemic acid, Tropic acid and an optically inactive alcohol, tropine. Thus atropine is the tropine ester of tropic acid or tropine tropate.



Atropine can't be an amide because tropine, the product of hydrolysis is a tertiary base.

a) Structure of Tropic acid:

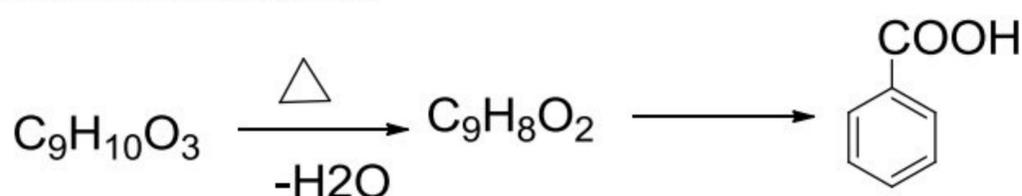
Molecular formula of the compound is $C_9H_{10}O_3$.

Tropic acid consumes one equivalent of alkali and doesn't add bromine it is a saturated monobasic acid.

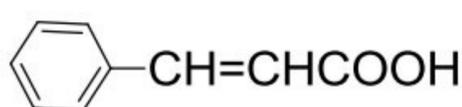
Tropic acid, on acetylation forms monoacetate indicating the presence of one hydroxyl group. The hydroxyl group must be an alcoholic group.

Tropic acid on heated strongly it loses a molecule of water to yield an optically inactive unsaturated acid, atropic acid $C_9H_8O_2$

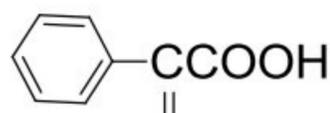
Atropic acid, on oxidation yields benzoic acid. The formation of benzoic acid reveals that atropic acid and tropic acid contain atleast one benzene nucleus with a side chain containing carboxylic acid in their structure.



As atropic acid is an unsaturated acid it mean atropic acid may be either structure (I) or (II) .

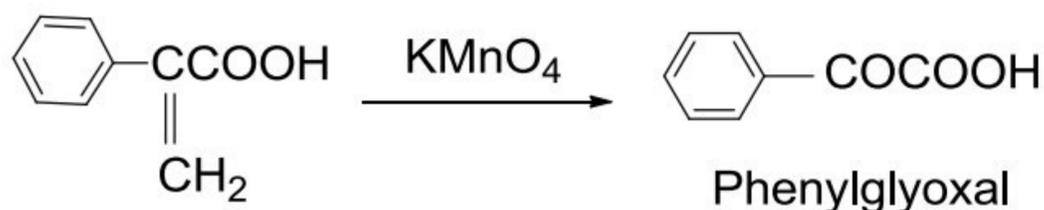


Structure (I)



Structure (II)

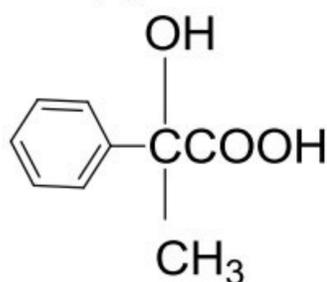
Hence, the structure (II) is atropic acid which is confirmed by oxidation with $KMnO_4$ to form phenylglyoxal.



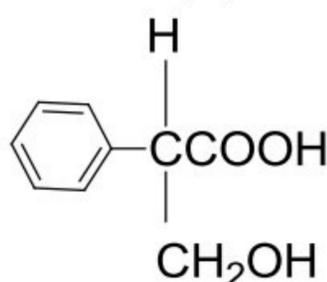
Atropic acid is formed by the dehydration of tropic acid. Hence addition of water to atropic acid gives tropic acid.

Therefore, tropic acid is

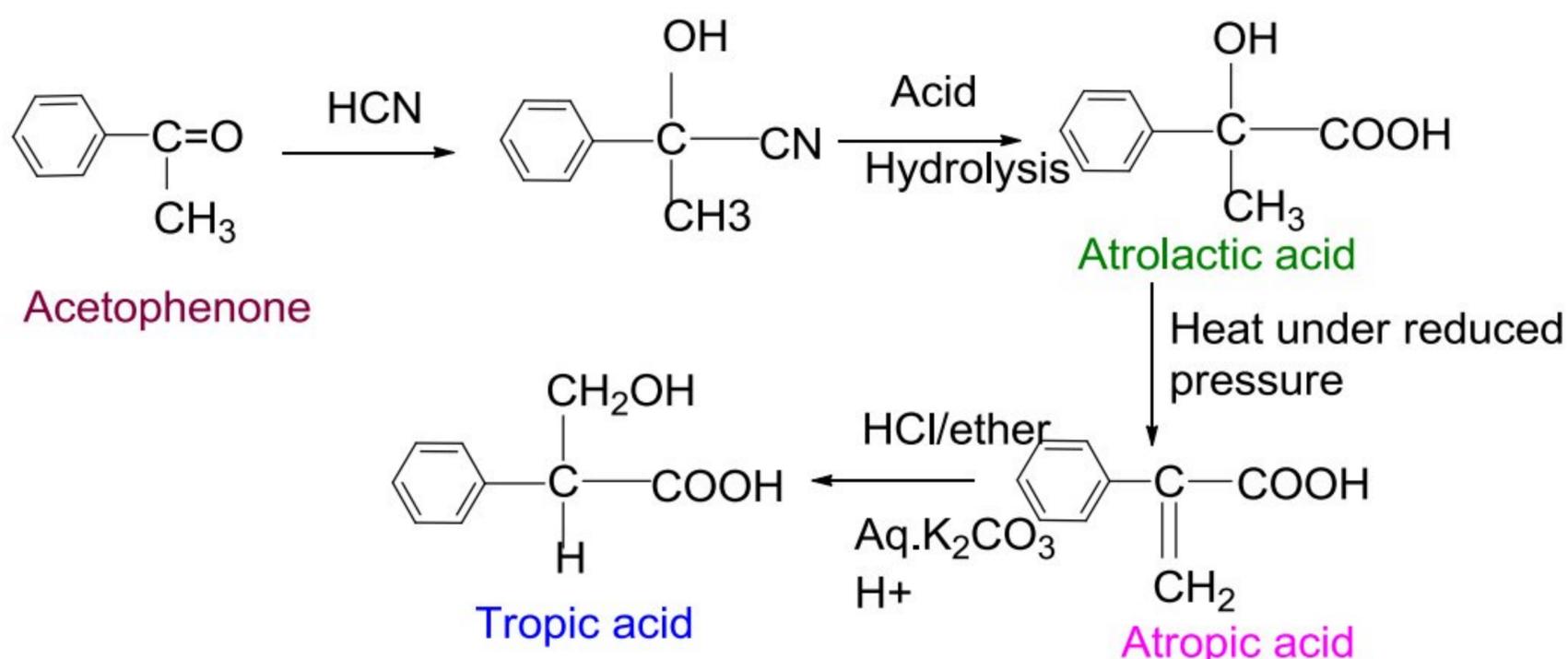
Structure (III)



Structure (IV)



Synthesis of tropic acid from acetophenone



b) Structure of Tropine:

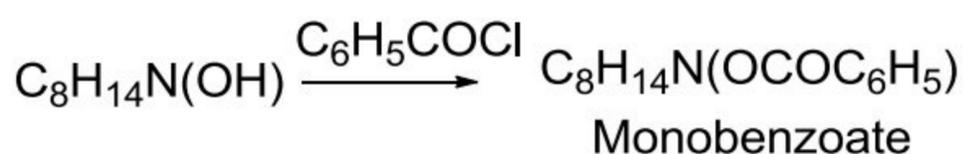
Molecular formula has been found to be $\text{C}_8\text{H}_{15}\text{NO}$.

Tropine on heating with methyl iodide it yields a crystalline additive product in which nitrogen is in tertiary state.

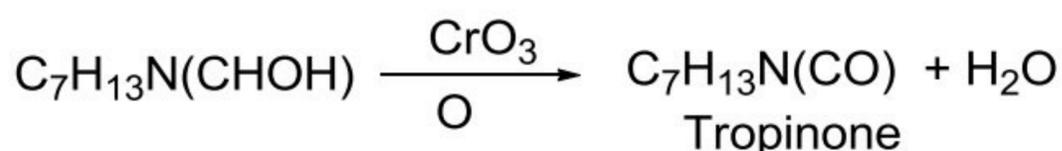


On fusing with alkali, tropine yields methyl amine indicating the formation of N-methyl group. Tropine on heating with HI at 150°C yields one molecule of CH_3I .

Tropine forms monoacetate and monobenzoate indicating the presence of alcoholic hydroxyl group.



Tropine is oxidised with chromic acid, to yield tropinone, $\text{C}_8\text{H}_{13}\text{NO}$ which gives characteristic reactions of ketone hence the hydroxyl group must be a secondary alcoholic group.



Tropine on treatment with HNO_2 and benzaldehyde it yields dioximino and dibenzylidene derivative indicating the presence of $-\text{CH}_2-\text{CO}-\text{CH}_2-$ group.