

Alkaloids :-Quinine :-

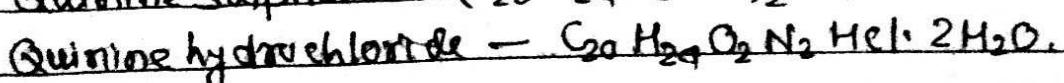
It occurs along with more than two dozen alkaloids in the bark of cinchona tree. Quinine, the most important of these has been used as antimalarial for centuries. In fact the name ~~Cinchona~~ cinchona was given to the tree because the material obtained from it was successfully employed in treating the wife of Count cinchona, Spanish viceroy Peru. In recent times the main source of quinine has been plantations in the Dutch East Indies chiefly Java.

Isolation - The finely powdered cinchona bark is extracted with benzene or toluene in the presence of alkali. It is present in the bark as ester of quinic quinonic acids and passes into the solvent extract after being liberated by alkali. The mixture of alkaloids is then extracted from the solvent layer by dilute sulphuric acid. When the acid extracted so obtained is neutralized with alkali, the sparingly soluble quinine sulphate precipitates out. The other minor alkaloids present left behind are precipitated from the filtrate with excess of alkali.

Quinine was synthesised by Woodward and Doering in 1944, but a commercially feasible process has never been realised.

Properties of Quinine :-

Quinine is a white solid. It has an intensely bitter taste. The alkaloid is very sparingly soluble in water but dissolves in organic solvents such as benzene, toluene, chloroform, ether etc. The natural quinine is levo-rotatory. It is very weakly dibasic but forms well-defined salts with acids. Examples -



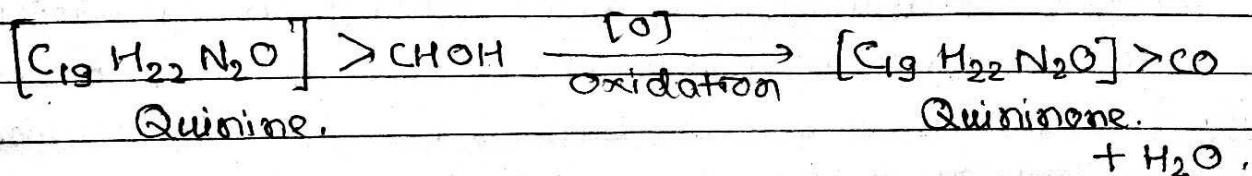


Quinine has mp 177°C.

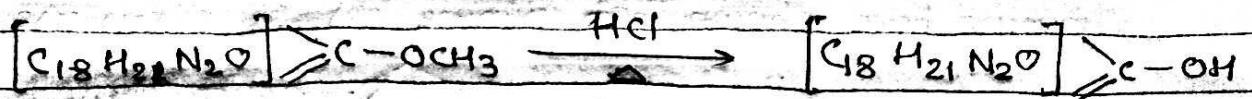
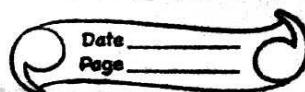
Quinine has a specific property of fighting down malarial parasites in the human body. The drug is suppressive but not curative. Quinine and its salts were used for long as antimalarials. The alkaloid is also an antipyretic, that is, it lowers the body temperature in high fever. Quinine has now been replaced by more effective and less toxic medicines as atebrin, plasmochin.

Structure of Quinine :-

- (1) The molecular formula of quinine is $C_{20}H_{24}N_2O_2$.
- (2) Quinine reacts with two molecules of CH_3I to form di-quaternary salt which suggests that both the N atoms present in the molecule are tertiary.
- (3) Quinine readily forms the acetyl derivative and chlorocompound on treatment with acetic anhydride and phosphorus pentachloride respectively. Therefore it contains one -OH group.
- (4) On mild oxidation the alkaloid is converted into a ketone, quininone, without loss of any carbon. This shows that the -OH group is present as secondary alcohol group.



- (5) On heating with hydrochloric acid quinine loses one carbon atom as CH_3Cl , indicating that the secondary oxygen in the molecule is present as methoxy (OCH_3) group.

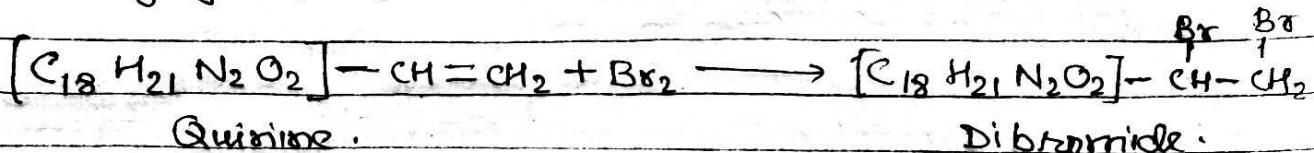


Quinine.

Cinchonine.

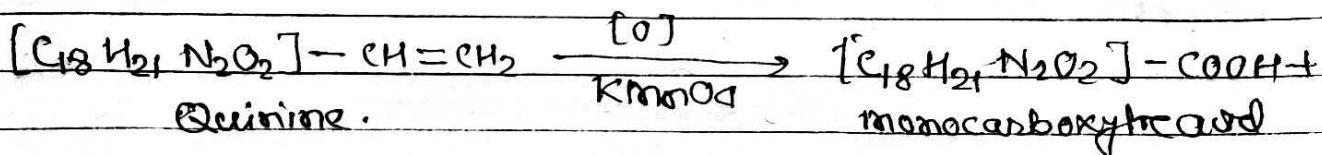
+ CH_3Cl .

- (6) Quinine reacts with Br_2 or halogen acids, showing the presence of a double bond in the molecule. Also quinine on oxidation with KMnO_4 yields a monocarboxylic acid and formic acid which confirms the presence of double bond in a vinyl group ($-\text{CH}=\text{CH}_2$)

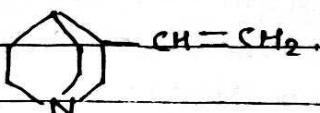
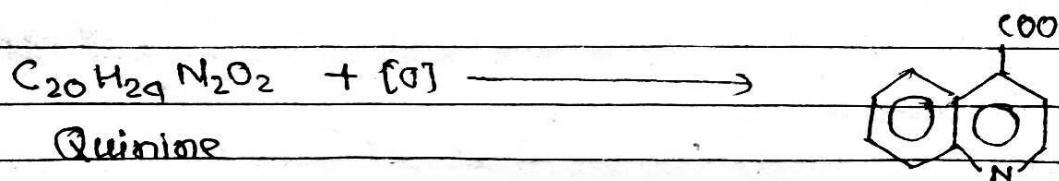


Quinine.

Dibromide.


 HCOOH
formic acid.

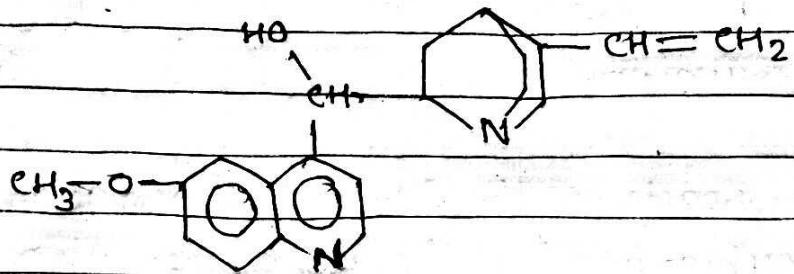
- (7) Quinine on vigorous oxidation with chromic acid yields quinine acid and 3-vinylquinuclidine.



3-Vinyl-quinuclidine.

- (8) The above reactions supplemented by evidence of complex

nature have shown that quinine has the structure -



Quinine