

M.Sc. Sem- IV

Paper- XIV c (Unit-3)

Topic - Geraniol

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GERANIOL ( $C_{10}H_{18}O$ ) - 3,7-Dimethyl-2,6-octadien-1-Ol.

Geraniol is the alcohol corresponding to geranial. It is found in the oils of rose (40 to 50%), palmarosa (70 to 80%), geranium, eucalyptus, and citronella.

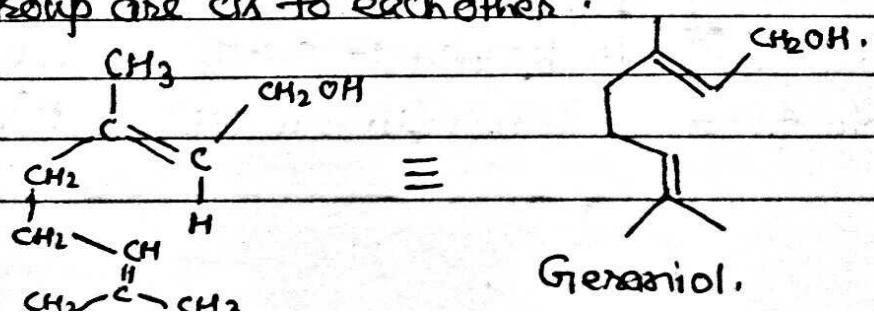
Isolation :- Geraniol is obtained from the cheap oil of palmarosa. The oil is treated with anhydrous calcium chloride with which geraniol forms a crystalline addition product. This crystalline addition product is then decomposed with water to give pure geraniol.

Structure of Geraniol :-

The structure of Geraniol has been deduced as follows -

- Elemental analysis and molecular weight determination show that the molecular formula of geraniol is  $C_{10}H_{18}O$ .
- Geraniol reacts with bromine (2 molecules) to form the tetrabromo derivatives (2,3,6,7-tetrabromo-3,7-dimethyl-1-octene). This indicates the presence of two carbon-carbon double bonds in the geraniol molecule.
- Geraniol does not form oxime with hydroxylamine. This indicates the absence of aldehyde (-CHO) or ketone (-CO-) group.
- Geraniol can be obtained by the reduction of citral- $\alpha$  (geranial) with sodium amalgam or ethyl or, isopropyl alcohol in the presence of an aluminium alkoxide catalyst (Meerwein-Ponndorf-Verley reduction). Geraniol also undergoes oxidation to give citral- $\alpha$ . These reactions indicate the presence of primary alcohol group in geraniol and its relationship with citral- $\alpha$ .

The above facts clearly show that geraniol has the following structure. In structure of geraniol methyl and the  $-CH_2OH$  group are cis to each other.



## Properties of Geraniol

### Physical properties

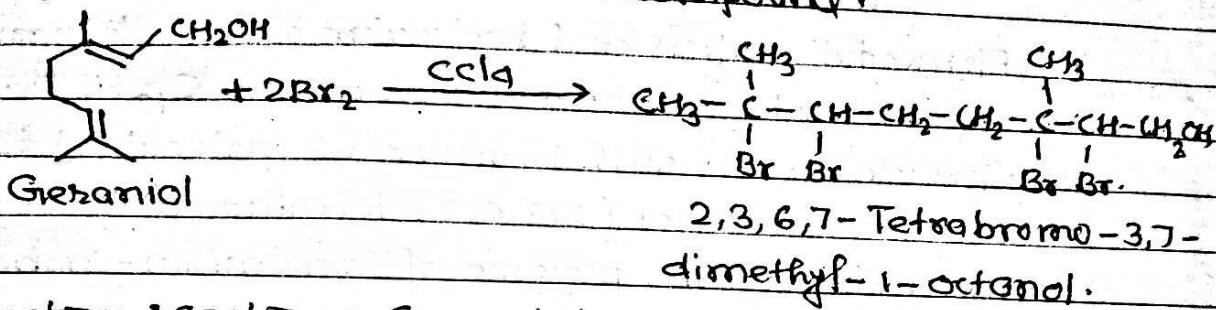
Geraniol is colourless liquid with a sweet rose odour. It boils at 230°C. Geraniol is insoluble in water but dissolves in ethanol.

### Chemical properties

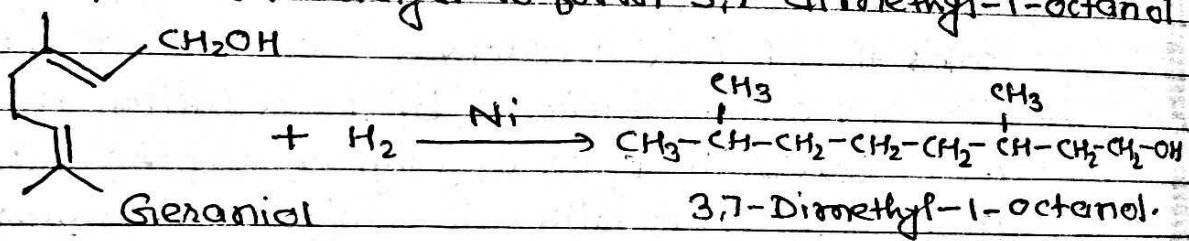
Geraniol gives the reactions of alkenes and primary alcohol. Some important reaction as following -

#### 1. Reaction with bromine :-

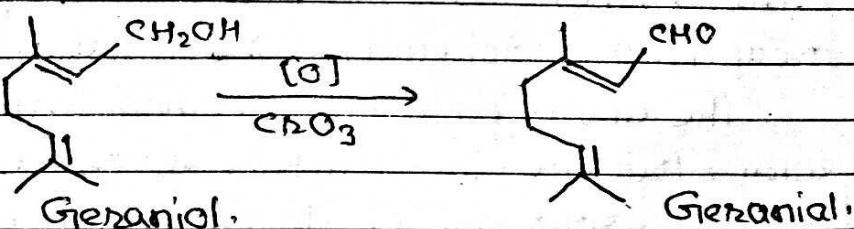
Geraniol reacts with bromine in presence of inert solvent  $\text{CCl}_4$  to form tetrabromo addition compound.



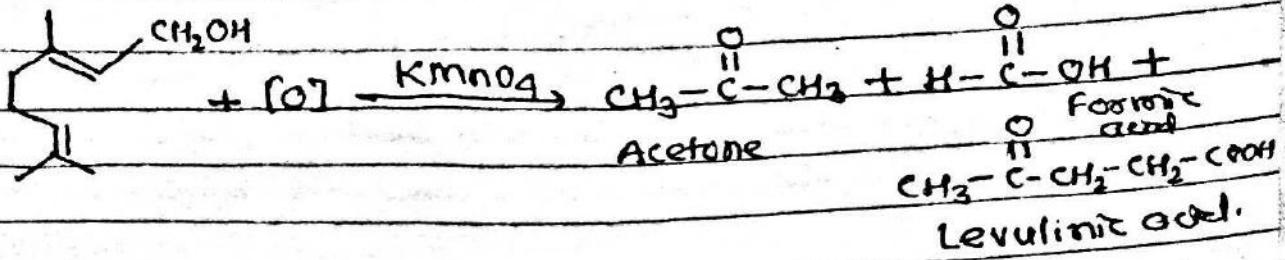
#### 2. Reduction reaction : Geraniol reacts with hydrogen in presence of Nickel catalyst to form 3,7-dimethyl-1-octanol.



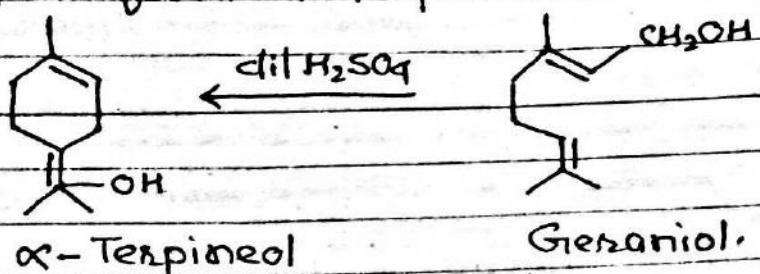
#### 3. Oxidation : Geraniol oxidised by chromium oxide to form Geranial.



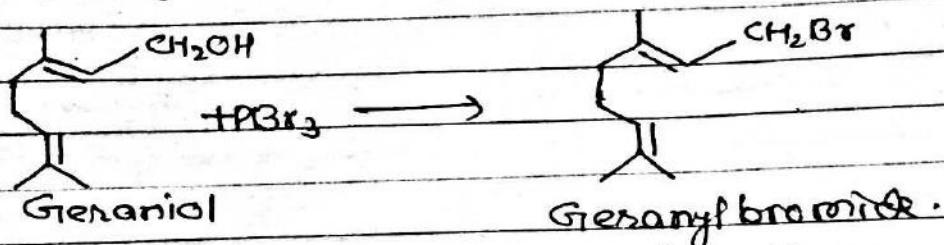
#### 4. Oxidation with $\text{KMnO}_4$ :- Geraniol oxidised with $\text{KMnO}_4$ to form acetone, formic acid and levulinic acid.



5. Reaction with dil  $\text{H}_2\text{SO}_4$  :- Geraniol reacts with dil  $\text{H}_2\text{SO}_4$  to form  $\alpha$ -Terpineol.



6. Reaction with  $\text{PBr}_3$  :- Geraniol reacts with  $\text{PBr}_3$  to form geranyl bromide.



Uses of Geraniol - Geraniol is used in the manufacture of artificial rose scents. It is widely used in perfume, cosmetic and flavour industries. It is also used as an agent for luring insects into traps.

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