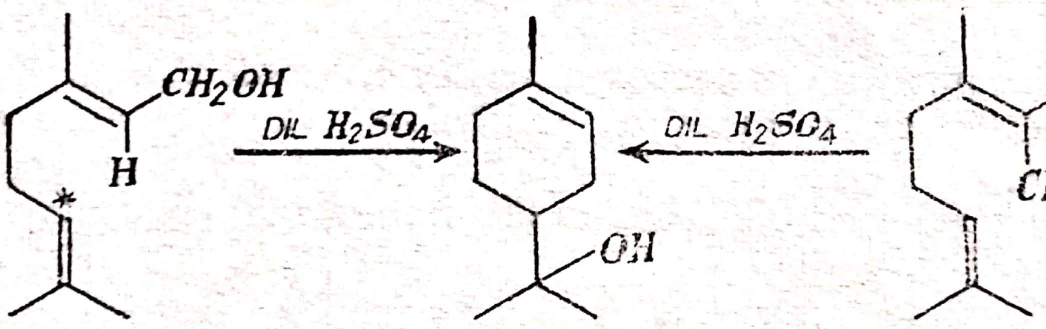
5. **Geraniol, $C_{10}H_{18}O$.**—Geraniol occurs in rose, lemon-grass, geranium, lavender and citronella oils. It is obtained from the cheap oil of palmrosa by treating with anhydrous calcium chloride and decomposing the crystalline addition product thus obtained with water. It may also be obtained by reduction of citral (corresponding aldehyde) with aluminium amalgam, but some **nerol** is also formed at the same time. Structural identity of geraniol and nerol is shown by the following facts :

(*i*) On catalytic hydrogenation both add two molecules of hydrogen and give the same saturated alcohol, $C_{10}H_{22}O$.

(*ii*) On oxidation, both give the same oxidation products which give the position of double bonds also as 2 and 7.

Hence geraniol and nerol are geometrical isomers. Cyclisation of nerol to α-terpineol by means of dilute sulphuric acid takes place about 9 times as fast as the cyclisation of geraniol. Based on this observation nerol has been assigned *cis* configuration whereas geraniol has been assigned *trans* configuration. Faster rate of cyclisation with nerol is due to the proximity of the alcoholic group to the carbon (*) which is involved in the ring formation.

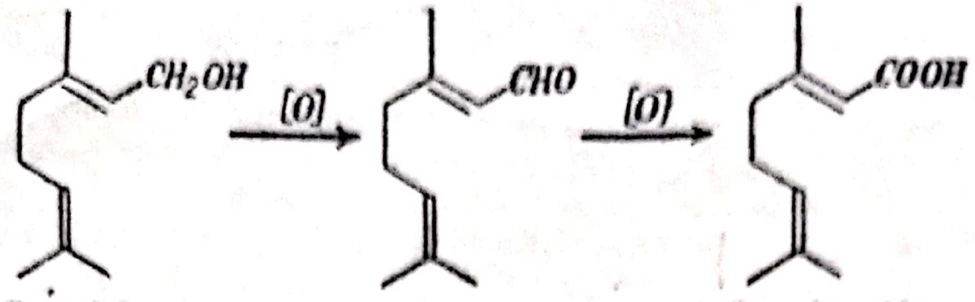


Geraniol (*Trans*) α-Terpineol Nerol (*Cis*)

Nerol is found in neroli oil, cyclamen oil and bergamot oil and is obtained from them.

Properties. Both geraniol and nerol are colourless liquids having pleasant rose-like odour. Due to the presence of two double bonds and a primary alcoholic group they exhibit the reactions of a diolefin and a primary alcohol.

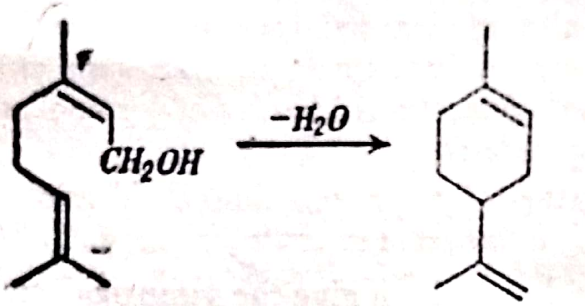
(*i*) On oxidation geraniol gives citral which on further oxidation gives geranic acid.



Geraniol Citral Geranic acid

(*ii*) Both geraniol and nerol react with dilute sulphuric acid to give a cyclic terpene—α-terpineol. This may be viewed as taking place by loss of a molecule of water resulting in ring closure followed by hydration of the side-chain at the position of double bond.

(*iii*) Nerol readily loses water to form dipentene (a cyclic hydrocarbon).



Nerol Dipentene or Limonene

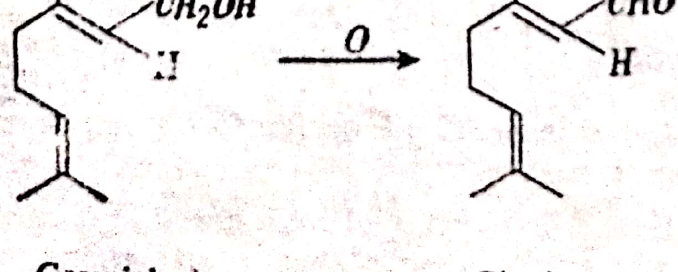
Constitution of Geraniol. (*i*) Molecular formula of geraniol as deduced from its analytical data is $C_{10}H_{18}O$.

(*ii*) It gives the reactions of a diolefin, *e.g.*, on bromination it gives a tetrabromide and four hydrogen atoms are added during reduction. This shows the presence of two double bonds.

(*iii*) It exhibits the reactions of a primary alcohol, *e.g.*, on oxidation it gives an aldehyde (citral-*a*) and on further oxidation gives an acid (geranic acid) containing the same number of carbon atoms.

(*iv*) Arrangement of carbon atoms in its molecule is the same as in citral which it gives on oxidation. For structure of citral *see* page 3·179.

(*v*) Hence structural formula of geraniol is :

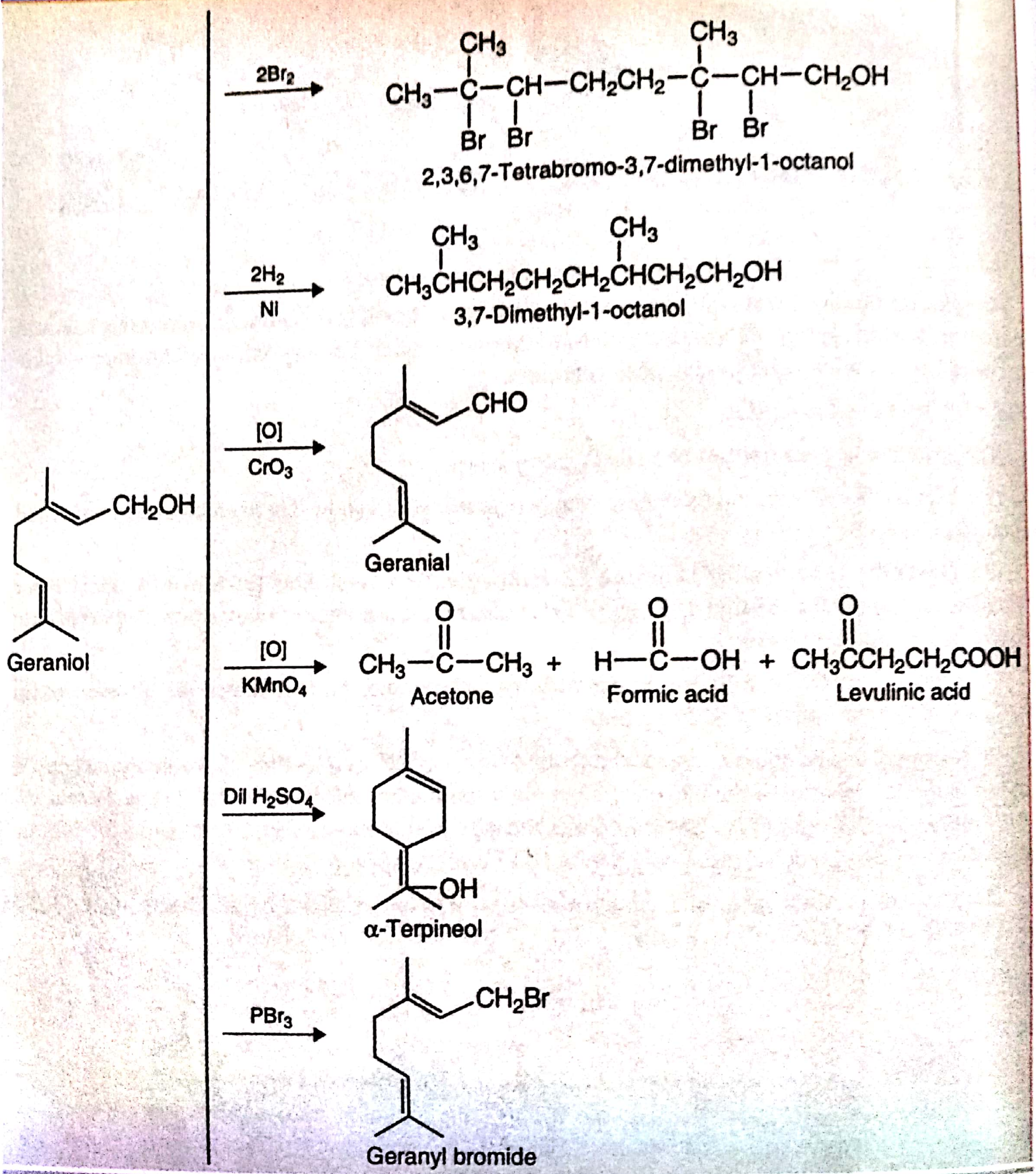


Geraniol Citral-*a*

(*vi*) This explains the formation of α-terpineol by ring closure.

Chemical. Geraniol gives the reactions of alkenes and primary alcohols. Some of its important reactions are listed in Table 43.3.

Table 43.3 IMPORTANT REACTIONS OF GERANIOL



USES OF GERANIOL

Geraniol is used in the manufacture of artificial rose scents. It is widely used in perfume, cosmetic, and flavor industries.