

M. Sc. Sem-II

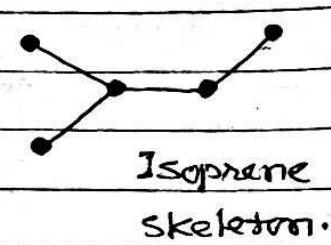
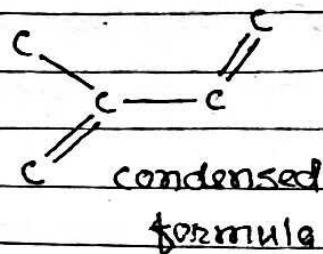
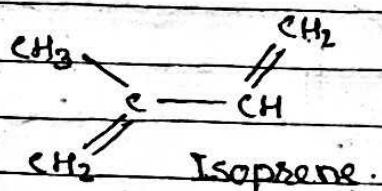
Paper-VII (Unit-5) Topic - Isoprene rule.

Isoprene rule :-

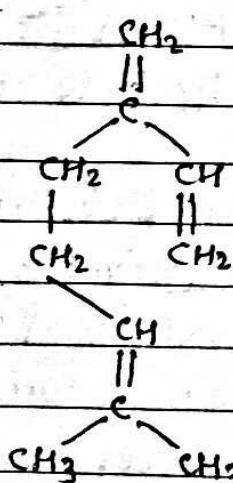
From a study of the molecular structure of a large number of them known terpenes, Otto Wallach gave the so-called Isoprene rule.

It states that - The molecules of all terpenes are constructed of two or more isoprene (Iso-C_5) units usually joined in a head-to-tail fashion.

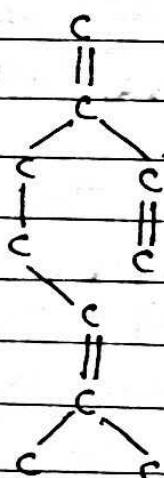
Isoprene is 2-methyl-1,3-butadiene and may be represented as



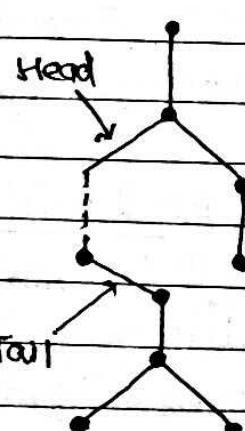
In applying Isoprene rule, we look only for the skeletal unit Iso-C_5 neglecting the numbers and positions of double bonds. Thus the terpene known as myrcene could be dissected by the dashed line into two isoprene units that are joined head-to-tail.



Myrcene.



condensed formula.

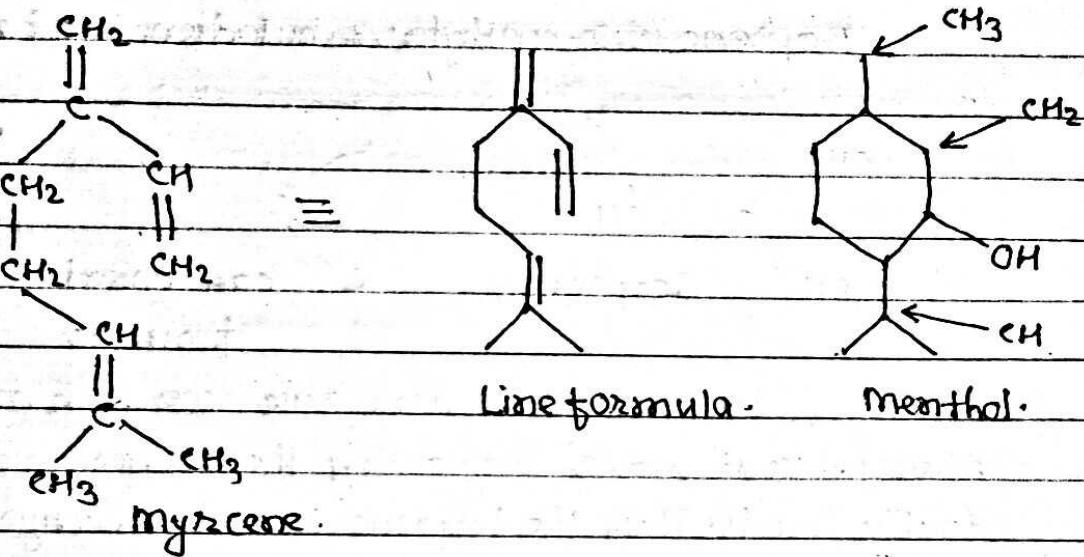


Carbon skeleton
(dotted bond shows
head-to-tail
arrangement.)

Isoprene rule although generally valid is not universal. It has proved of great help in deriving the structure of terpenes.

Line formulas of Terpenes :-

The structures are frequently written with line formulas. The carbon-carbon bonds are represented by lines. The carbon atoms with appropriate number of hydrogen bonds are understood to be present at corners or junctions and the ends of lines. Thus the line formulae of myrcene and menthol may be written as -



Isolation of Terpenes :-

Essential oils are first extracted from the plant source (Leaves, flowers, stem or root) mainly by three methods.

1. Steam Distillation :- The macerated plant material is steam distilled. The oil if any is collected separately. The aqueous steam distillate is saturated with salt and extracted with a purified solvent or light petroleum or benzene. The combined oil and the solvent extract are dried. The solvent is then removed by evaporation under reduced pressure to give the essential oil.
2. Direct Solvent Extraction :- If a particular terpene is decomposed under the conditions of steam distillation, the plant material is directly extracted with light petroleum or ethers at room

temperature. The extract is filtered and the solvent removed by evaporation under vacuum to recover the essential oil.

3. By fat adsorption :- The flower petals are spread over a molten layer of fat (tallow and lard) for several days. The fat enriched with adsorbed essential oil from petals, is stirred with pure ethanol. The ethanol extract is then evaporated at 0°C in vacuum to give the essential oil.

The essential oils obtained as above are usually mixture of many terpenes. These are separated by fractional distillation or vapour-phase chromatography. Chemical methods are also used where possible.