

pharmacognosy

3rd stage/1st term

Volatile oils

part 1

Dr. Zahraa Shubber



Volatile Oils

- Volatile oils are the odorous liquid obtained from various plant parts.
- Volatile oils **evaporate** on exposure to air at ordinary temperature.
- As volatile oils are responsible for the essence or odour of the plant they are also known as **essential oils**.



- All volatile oils consist of complex chemical mixtures.
- they vary in their chemical composition that they consist of many organic compounds as (hydrocarbons, alcohol, ketone, aldehydes, oxides, esters and others), and only a few possess a single component in a high percentage e.g.

1. Volatile mustard oil yields not less than 93% of allylisothiocyanate

2. Clove oil contains not less than 85% of phenolic substances, chiefly eugenol.

Properties of volatile oils

- Volatile oils are colorless, particularly when they are fresh, but on long standing they may oxidize and resinify, thus **darkening in color**. **To prevent this darkening, they should be stored in a cool, dry place.**
- They possess characteristic odors, immiscible with water, but they are sufficiently soluble to impart their odor to water as aromatic waters. Volatile oils, are soluble in ether, alcohol, and most organic solvents.

Differences between volatile oils and fixed oils

1. Volatile oils can be **distilled** from their natural sources
2. They **do not** consist of **glyceryl esters of fatty acids**
3. They **do not** leave **permanent grease spot** on paper and **cannot be saponified with alkalies**
4. They **do not become rancid** as do the fixed oils but instead, on exposure to light and air they **oxidize and resinify**

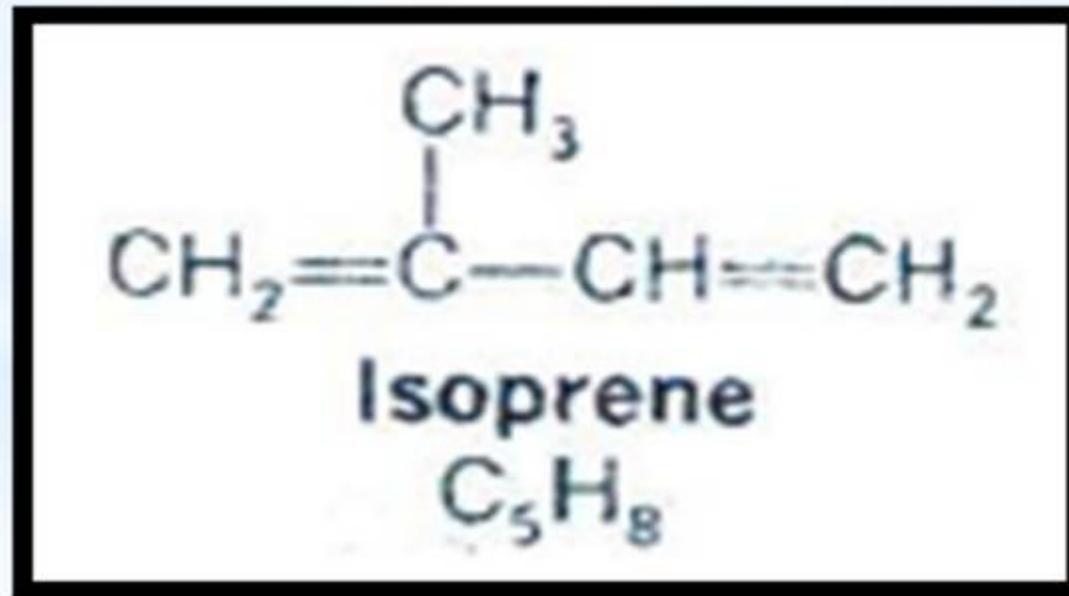


Chemistry of volatile oil

- Chemical constituents of volatile oils may be divided into two classes based on their biosynthetic origin,
- **terpene derivative** (formed via the **acetate-mevalonic acid pathway**,
- and **aromatic compounds** (phenyl propanoids) (formed via the **shikirnic acid-phenylpropanoid route**).

1. Terpenes

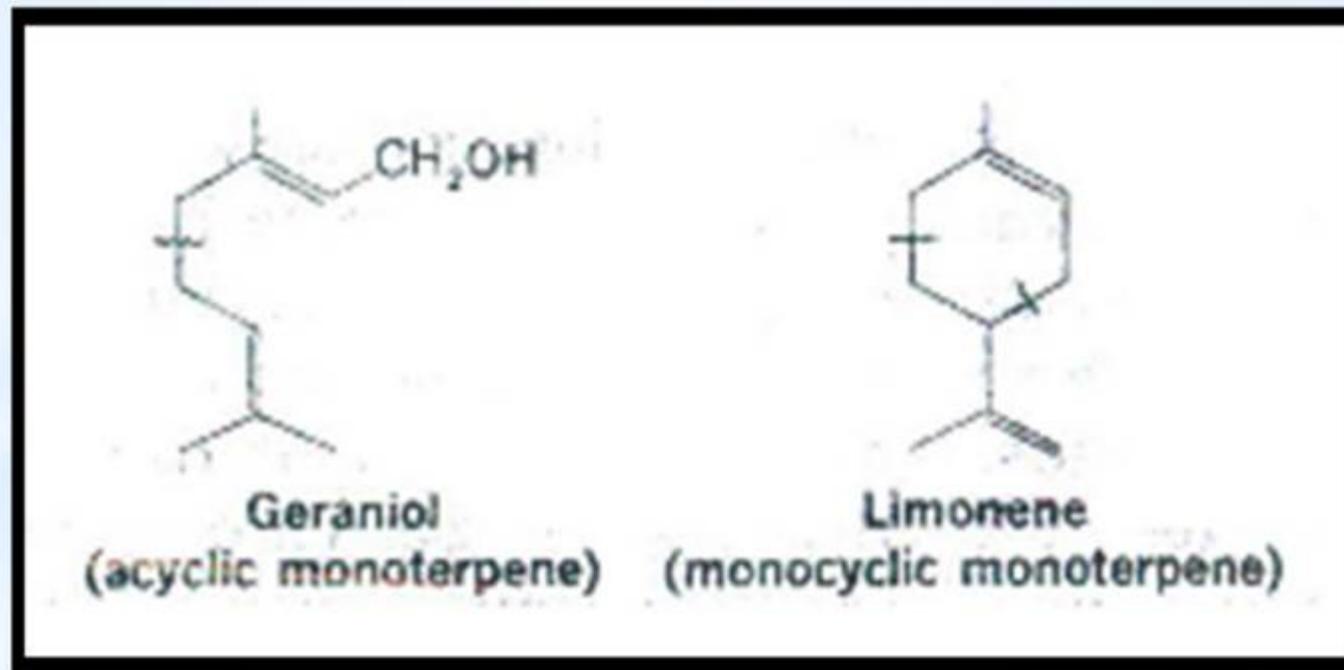
- Terpenes are defined as natural products whose structures consist of isoprene units.
- These units arise from acetate via mevalonic acid and are branched-chain, 5-carbon units containing 2 unsaturated bonds.



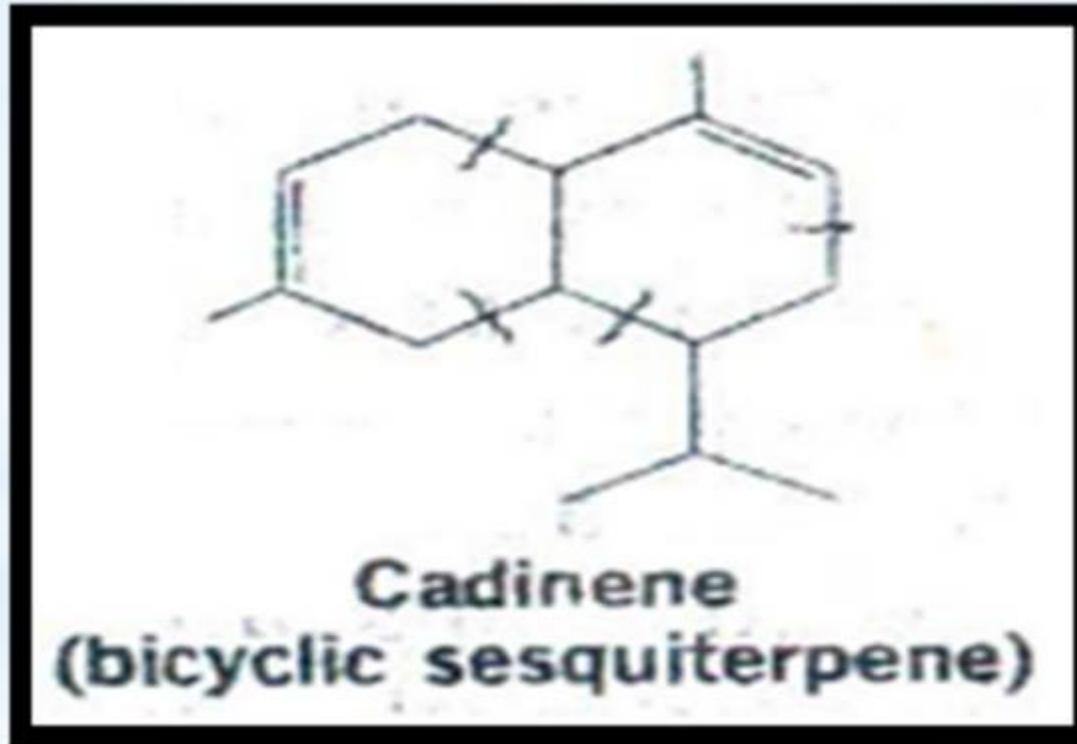
1. Terpenes Classification

Depends on the number of isoprene units, terpenes can be classified into:

1. Monoterpenes: are composed of 2 isoprene units
example geraniol and limon



2. Sesquiterpenes: contain 3 isoprene units.
Example cadinene



3. Diterpenes: are consist of 4 isoprene units

4. Triterpenes: are composed of 6 isoprene units.

The terpenes found most often in volatile oils are monoterpenes.



2. Phenyl propanoids

They are another major group of volatile-oil constituents. These compounds contain the C₆ phenyl ring with an attached C₃ propane side chain.

Methods of Obtaining Volatile Oils

- 1. Distillation in water or steam**
- 2. Expression**
- 3. Extraction**
- 4. Enzymatic hydrolysis**

Medicinal and Commercial Uses

1. Used as **flavoring agent**
2. **Local irritant** e.g. camphor
3. **Anesthetic** e.g. clove oil
4. **Prophylactic** against insects e.g. citronella oil
5. **Bactericidal and antiseptic** as in soap and gargles
6. **Against asthma**, the action is due to volatile oil which irritate the mucous membrane of the respiratory tract causing the expectorant action

7. **Carminatives** e.g. peppermint oil

8. **Urinary antiseptic** e.g. Buchu leaves

9. **Anthelmintic** e.g. ascaridol

10. **The manufacture of perfumes, soaps, and deodorizers** and for providing odor to household cleaners, polishes, and insecticides

Classification of volatile oils and volatile oil containing drugs

- (1) Hydrocarbons
- (2) Alcohols
- (3) Aldehydes
- (4) Ketones
- (5) Phenols
- (6) Phenolic ethers
- (7) Oxides
- (8) Esters

Evaluation of Volatile Oils

Several physical and chemical properties are used to evaluate the volatile oils.

-Physical properties

- 1.Solubility**
- 2.Specific gravity**
- 3.Refractive index**
- 4.Optical rotation**

-Chemical properties

- 1.Determination of acid**
- 2.Determination of ester**
- 3.Determination of alcohol**
- 4.Determination of ketone and aldehyde**
- 5.Determination of phenol**

Thank You

