

PHARMACOCNOSY



3rdstage / 1sttrem

Volatile oils

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volatile oils

- Vol. oils also called **essential oils**.
- Vol. oils are **odorous** compounds found in different parts of plants.
- They **evaporate** when exposed to air at ordinary temperatures.
- Vol. oils are **colorless** when they are **fresh**, but on **long standing**, they may be oxidized and thus **darkening** in color. To **prevent** this darkening, they should be stored in a cool, dry place.

Differences between volatile oils and fixed oils

- Vol. oil **not** glyceryl esters of fatty acids.
- do **not** leaves permanent grease spot in paper.
- **not** saponified with alkali.
- **not** become rancid but on exposure to air and light becomes oxidized and resinify.

physical properties of volatile Oils

- They possess characteristic **odors**
 - high refractive index.
 - optically active.
 - Density (high density best odors).

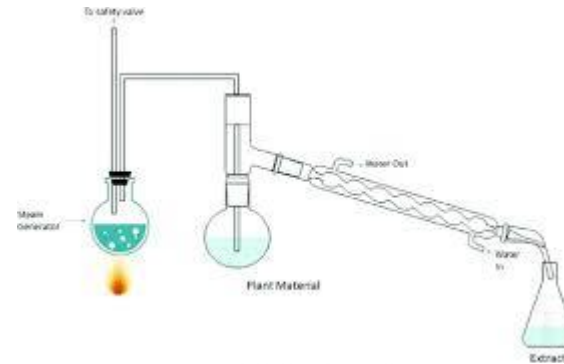
- Vol. oils are **immiscible** with water but **soluble** in ether , alcohol and most organic solvents.

Chemistry of Volatile Oils

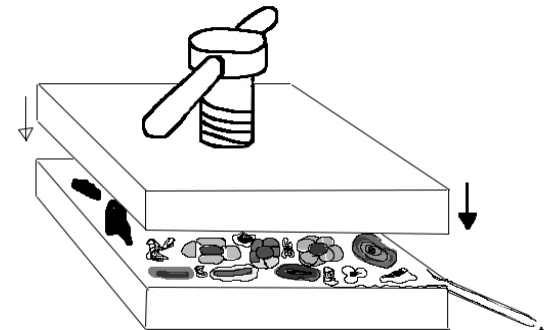
- All volatile oils consist of complex chemical mixtures.
- Volatile oils vary widely in the chemical composition almost any type of organic compound may be found in vol. oils (hydrocarbon, alcohols, ketones, aldehydes ,oxides ,esters and others).
 - **Eleoptenes** which is hydrocarbon portion of the oil.
 - **Stearoptene** which is oxygenated compounds derived from hydrocarbons.

Methods of obtaining Volatile Oils

- Distillation in water or steam.
- Expression.
- Enzymatic hydrolysis
- Enfleurage
- Extraction by solvent.



EXPRESSION



PLANT ARE PRESSED TO SQUEEZE OUT OILS



Evaluation of volatile oils

- **primary examination:** odor and taste, color.
- **Physical measurements:** optical rotation, relative density, refractive index.
- **Gas Chromatography**
- **Clevenger method**



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

➤ According to:

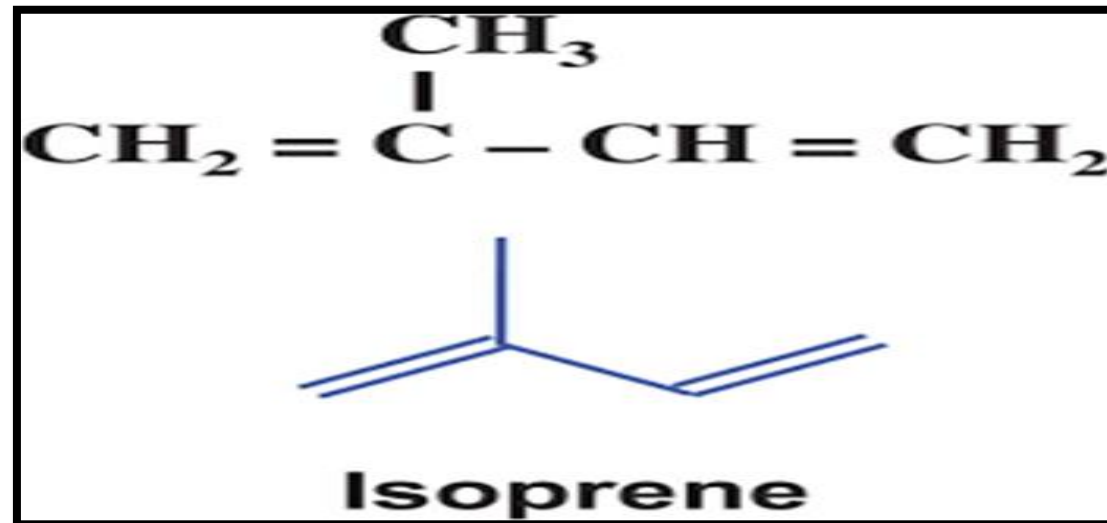
1. Biosynthetic pathways

- a. **Terpene derivative** (formed via the acetate-mevalonic acid pathway).
- b. **Aromatic compounds** formed via the shikimic acid-phenylpropanoid route.

2. Chemical *group basis*

a. Terpenes

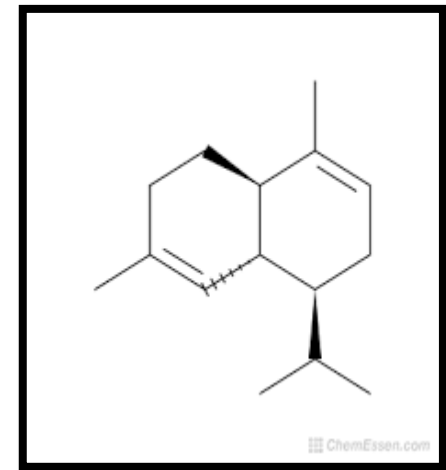
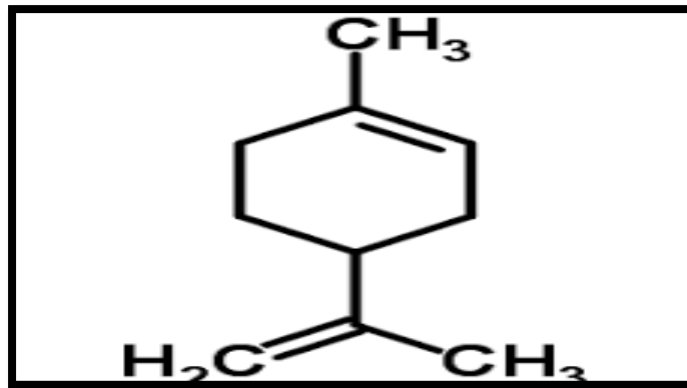
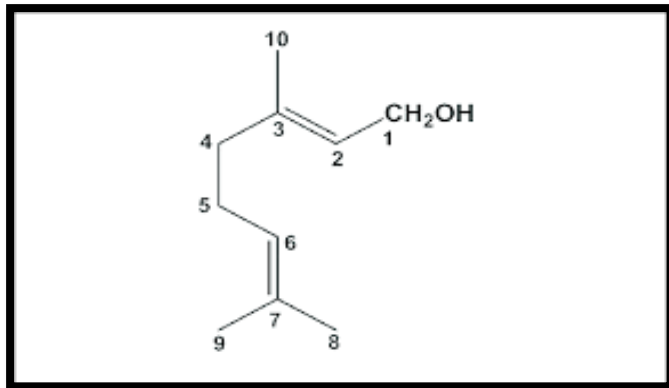
- They are defined as natural products whose structure consist of **isoprene** units.
- These units arise from acetate by **mevalonic acid** and are branched – chain, **5- carbon units** containing two unsaturated bonds.



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

1. Monoterpene (two isoprene units) C₁₀H₁₆. EX: **Geranoil, limonen.**
2. Sesquiterpenes (three isoprene units) C₁₅H₂₄. EX: **cadinene**
3. Diterpenes (four isoprene units) C₂₀H₃₂
4. Triterpenes (six isoprene units) C₃₀H₄₈

✓ **The terpenes found most often in volatile oils are monoterpenes.**

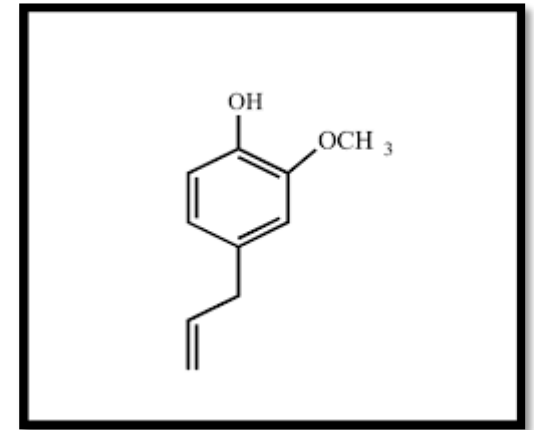


b. Phenyl propanoids

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

✓ 2. Chemical group basis :

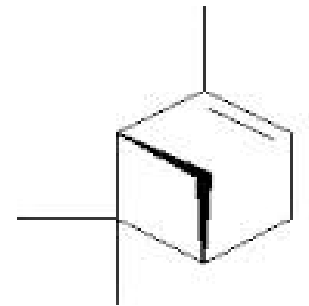
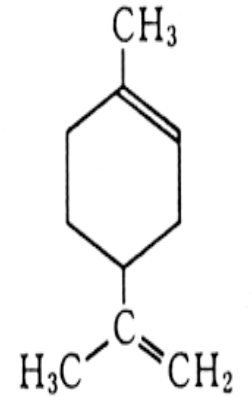
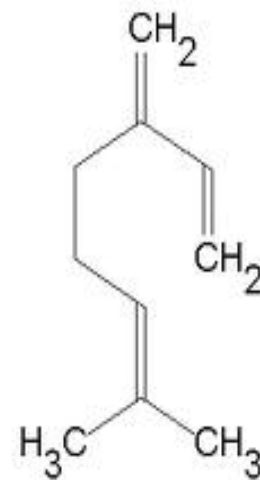
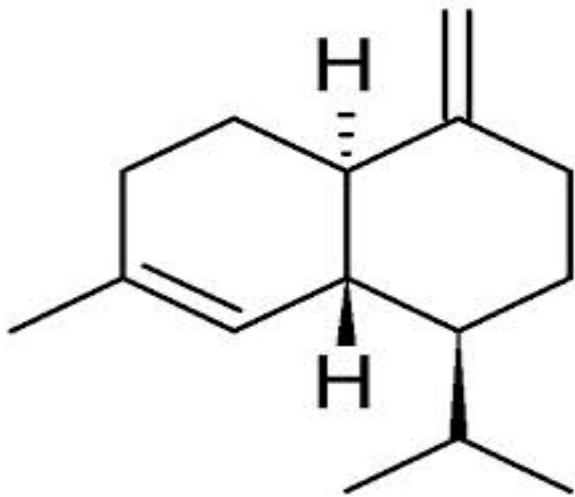
- (1) Hydrocarbons. (2) Alcohols.
- (3) Aldehydes. (4) Ketones.
- (5) Phenols. (6) Phenolic ethers.
- (7) Oxides. (8) Esters.



1. Hydrocarbons volatile oils

➤ they occur as:

- A. Monocyclic monoterpenes: e.g. Limonene.
- B. A bicyclic monoterpene: e.g. Pinene.
- C. Acyclic monoterpene hydrocarbons: e.g. myrcene.
- D. Sesquiterpene hydrocarbon: e.g. Cadinene.



Humulene:

- is a naturally occurring monocyclic sesquiterpene
- obtained from ***Humulus lupulus***.

➤ Use:

- anti-inflammatory
- It produces similar effects to dexamethasone
- and was found to decrease the edema formation caused by histamine injections.
- Humulene produced inhibitory effects on tumor necrosis factor- α (TNF α) and interleukin-1 β .



Oil of Turpentine

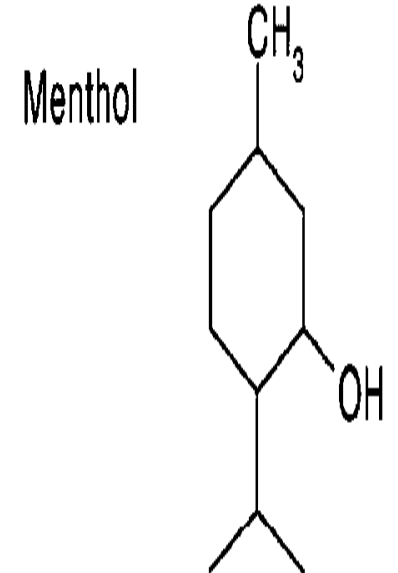
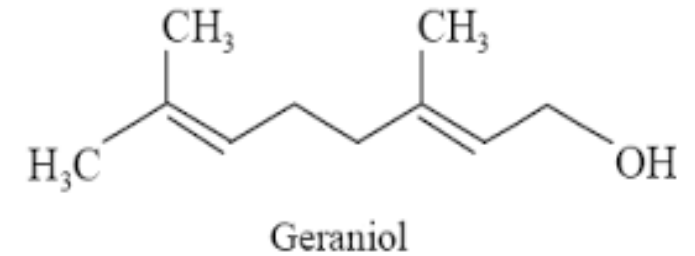
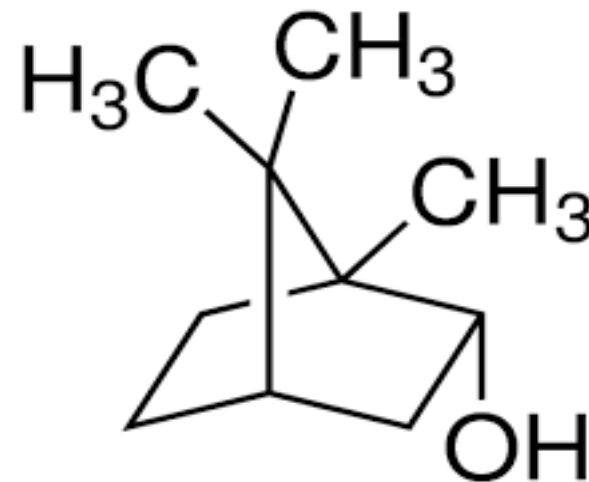
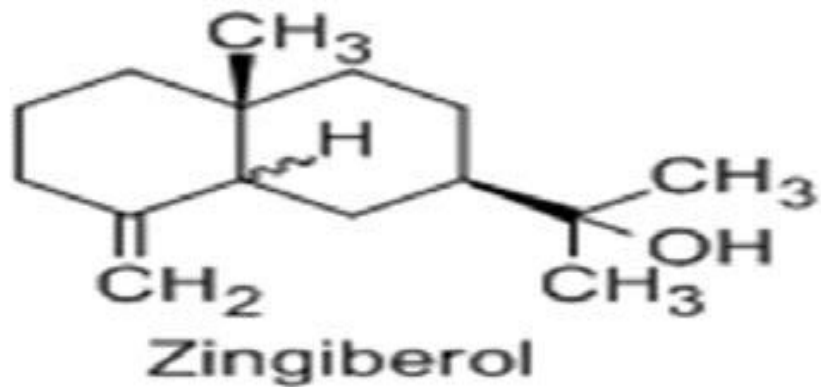
- Turpentine oil or spirits of turpentine is the volatile oil.
- volatile oil distilled from the oleoresin of *Pinus palustris* and from other species of *Pinus* Linné (Pinaceae).
- **Uses:** Turpentine oil is used as a **counterirritant** in Vicks Vaporub, and as **expectorant**.



2. Alcohol Volatile Oils

➤ Alcohols found in volatile oil may be classified into four groups:

1. Acyclic Alcohols: ex. Geraniol.
2. Monocyclic alcohols: ex. Menthol.
3. Dicyclic alcohols: ex. Borneol.
4. Sesquiterpene alcohols: ex. Zingiberol.



➤ The important alcohol volatile oil drugs are **peppermint, cardamom oil, rose oil, orange flower oil,** and **pine oil.**

✓ Peppermint oil

➤ dried leaves of *Mentha piperita* (Labiatae). Peppermint oil contains **menthol** as a major constituent.

➤ **Uses:** **carminative**, a **stimulant**, and a **counterirritant**, commercial use is as a **flavoring agent**, especially for **chewing gum** and in the **antacid** products.



3. *Ketone volatile oils*

➤ **divided into:**

A. Monocyclic terpene ketones: including menthone.

B. Dicyclic ketones: including camphor.

✓ *Camphor:*

➤ Camphor is a ketone obtained from *Cinnamomum camphora* (F: Lauraceae).

➤ **Uses:** Camphor is a topical **antipruritic**, **rubefacient**, and **anti-infective**.



✓ Caraway:

- Consist of dried ripe fruit of *Carum carvi* (F: Umbelliferae).
- Contains volatile oil from 5-7% and 2% fixed oil.
- **Uses:** It used as **flavoring** agent and **carminative**.



✓ Spearmint:

- Spearmint consists of the dried leaf and flowering top of *Mentha spicata* (Fam. Labiatae).
- **Uses:** **flavoring** agent and **carminative** properties.



4. Aldehyde Volatile Oils

divided into acyclic and cyclic:

A. Acyclic aldehyde: Neral

B. Cyclic aldehyde: Cinnamaldehyde, vanillin and Anise ...



➤ Aldehyde V. Oils are calming to the nervous system. They are best known to relieve stress and promote relaxation.

✓ **Cinnamon:**

➤ is the dried bark of *Cinnamomum loureirii*. (Fam. Lauraceae).

➤ Contains cinnamaldehyde as a Major compound.

➤ **Uses:** as **flavoring** agent, **carminative** and **antiseptic**.

Health Benefits Cinnamon

- reduce se level is blood sugar.
- Treats bad breath Diuretic.
- Anti- inflammatory, Increases blood circulation.
- reduces muscle and joint pain and soreness.
- boosts brain activity.



✓ Lemon Peel:

- Lemon is the fruit of Citrus limon (Fam. Rutaceae).
- Lemon peel is the outer yellow rind of the fresh ripe fruit of C. limon.

- **Constituents:** terpene (limonene), **aldehyde volatile oil**, Coumarins, flavonoids rutin, hesperidin.

- **Uses:** a **flavoring** agent, and **stimulant**.



✓ Lemon oil:

- obtained by expression, without the aid of heat, from the fresh peel of the fruit of *C. limon*.
- **Uses:** Lemon oil is a flavoring agent. It has stimulant, and carminative. It is also used in cosmetics and liquid cleansers because the aroma and flavor are widely accepted by consumers.



- ✓ **Bitter almond:** is the dried ripe kernels of *prunus amygdalis*, F: Rosaceae. Contains benzaldehyde.



5. Phenol Volatile Oils

✓ **Eugenol**, **thymol**, and **carvacrol** are the most important phenols occurring in volatile oils.

➤ **Thymol:**

➤ is a phenol obtained from thyme oil (*Thymus vulgaris*) F: labiatae.

➤ Uses: an **antifungal** and **antibacterial** agent.

It is employed topically in lotions, creams, and ointments.



✓ Clove:

- Clove or cloves is the dried flower bud of *Eugenia caryophyllus* (Fam. Myrtaceae).
- Contains chiefly **eugenol**.
- **Uses:** Clove oil is classed as a flavor. It is commonly employed as a toothache remedy that is applied topically to dental cavities as required. Clove oil also possesses **antiseptic**, **counterirritant**, and **carminative** properties.



6. Phenolic Ether Volatile Oils

✓ *Nutmeg*

- Nutmeg or myristica is the dried, ripe seed of *Myristica fragrans* (Fam. Myristicaceae).
- Contain volatile oil (myristicin) and **safrol** and **fixed oils**.
- **Uses:** a **flavor** and a **condiment**. it is a useful agent for **controlling diarrhea** associated with certain carcinomas. Has **CNS** effects, large quantity up to 15mg cause **hallucination**.



✓ *Anise:*

- consists of dried ripe fruit of *pimpinella anisum* F:umbelliferae.
- Contains 1-3 % volatile oils consist of 90-93% anethol.
- **Uses:** It used as carminative and flavoring agent.



✓ *7. Oxide Volatile Oils*

- **Cineole** (eucalyptol) is found in eucalyptus which consist of fresh leaves of *Eucalyptus globus* F: Myrtacea. contains about 70 to 85% cineole.
- **Uses:** a **flavor**. It is frequently used as an **antiseptic, diaphoretic, and expectorant**.



8. Ester Volatile Oils

- ✓ Examples of esters in volatile oils are **allyl isothiocyanate** in mustard oil and **methyl salicylate** in wintergreen oil.
- ✓ **Methyl salicylate**
 - is obtained from the leaves of *Gaultheria procumbens* F: Ericaceae.
 - **Uses:** It used as **analgesic, anti-inflammatory** drug, has **antiseptic**, and **antirheumatic** properties. Alleviate **fever, headache, sore throat** and various **ache pain**. It's a common **flavoring** agent for chewing gums, **candies**, and for **dental** hygiene products such as **mouth** wash and paste.



A top-down view of a desk setup. In the top left corner, there are green leaves of a plant. In the center, a spiral-bound notebook is open, with a white sticky note attached to the left page. The sticky note has the text 'THANK YOU FOR YOUR ATTENTION' written in bold, black, uppercase letters. To the right of the notebook, a pair of black-rimmed glasses is placed. Below the glasses, a silver pen lies horizontally. The background is a light-colored, possibly white, surface.

**THANK YOU
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