

VOLATILE OIL :- Volatile oils or essential oils.

as their name implies are volatile in steam. As they evaporate when exposed to air at ordinary temperatures, they are also called as ~~etheral~~ ethereal oils. They represent active constituent of plant hence they are also known as essential oils. Chemically they are derived from terpenes and their oxygenated compounds.

- Volatile oils are soluble in alcohol, ether and other lipid solvents and practically insoluble in water.
- They possess characteristic colours and have high refractive indices. Most of them are optically active.
- Volatile oils are extracted by

- steam distillation

Enuelle - ~~Enuelle~~ technique

- Enfleurage technique

⇒ Enuelle :- method is used for extraction of citrus oils, wherein oil cells in rind are ruptured mechanically using pointed projections by twisting raw material over them in clockwise direction either mechanically or manually.

⇒ Enfleurage :- method is used for extraction of delicate perfume. The fresh flower petals are mechanically spread on layer of fatty acid material, allowed to imbibe and exhausted petals are replaced by fresh material.

* Chemical tests for volatile oils :-

- 1) To the thin section of the drug, add alcoholic solution of Sudan-III. Red colour obtained by globules indicates the presence of volatile oil.
- 2) To the thin section of the drug, add a drop of tincture alkane. Red colour indicates the presence of volatile oil.

* Types of volatile oils :-

- 1) Alcohol volatile oils - ~~Ex~~ ^{Ex} Peppermint, cardamom, rose oil, coriander, sandalwood, orange flower.
- 2) Aldehyde volatile oils - ~~Ex~~ ^{Ex} Cinnamon, lemon peel, orange peel, citronella oil, lemon grass, bitter almond.
- 3) Ester volatile oils - ~~Ex~~ ^{Ex} Gaultheria, lavender, mustard.
- 4) Hydrocarbon volatile oils - ~~Ex~~ ^{Ex} Turpentine, black pepper.
- 5) Ketone volatile oils - ~~Ex~~ ^{Ex} Caraway, Spearmint, buchu, camphor, musk, civet oil.
- 6) Oxide volatile oils - ~~Ex~~ ^{Ex} Chenopodium, eucalyptus.
- 7) Phenolic ether volatile oils - ~~Ex~~ ^{Ex} Anise, fennel, nutmeg.
- 8) Phenol volatile oils - ~~Ex~~ ^{Ex} clove, thyme, creosol.

* Uses :-

- ⇒ Volatile oils are used as flavouring and perfuming agents in pharmaceutical formulations, foods, beverages and cosmetics.
- ⇒ They are also used as medicinal agent such as carminatives (ambelliferous fruit, cinnamon etc), anthelmintics (Chenopodium), diuretic (Juniper), antiseptic (eucalyptus), counter irritant (oil of wintergreen), local anaesthetic (clove), sedative (jatamansi), local irritant (turpentine) etc.
- ⇒ Terpenoid volatile oils are valuable perfuming and flavouring agents.
- ⇒ The sophisticated perfume industry utilizes solvent extraction technique for production of volatile oil,



* Extraction of Volatile oil by Distillation:-

- The distillation is carried out either by water or steam. The volatile oils from fresh material are separated by hydrodistillation and volatile oils from air dried parts are separated by steam distillation. However it is better to use fresh materials in either case

Name of drug.	Biological source, family.	Active Constituent	Uses
Mentha (Peppermint oil)	- fresh flowering top. - Mentha piperita - Labiatae	- Menthol, pulegone. - Menthone. - Menthofuran	- Carminative - flavour, perfume - Stimulant, Antiseptic
Clove (Clove flower, clove buds)	- Dried flower buds - Eugenia caryophyllata - Myrtaceae	- Eugenol - Ester - Eugenin	- Dental analgesic - Carminative, flavour. - Stimulant antiseptic
Cinnamon (Kalmi Salehina; Cinnamon bark)	- Inner bark of shoots - Cinnamomum zeylanicum - Lauraceae	- Eugenol - benzaldehyde - Cinnamaldehyde	- Carminative - flavour, Stimulant - Astringent, Antiseptic
Fennel (fennel fruits)	- Dried ripe fruit - Foeniculum vulgare - Umbelliferae	- Fenchone. - Anethole, ketone. - Limonene. - phellandrene	- Carminative - Expectorant - flavour - stimulant
Coriander (Coriander fruit)	- Coriandrum sativum - Umbelliferae	- Coriandrol - Coriandryl acetate - L-borneol, geraniol - Pinene	- Aromatic, flavour - Carminative - Stimulant

* Mentha oil :-

Synonyms :- Oleum menthe piperitis, Mentha oil

* Biological source :- The oil is obtained by steam distillation of the fresh flowering top of the plant known as Mentha piperita, belonging to family Labiatae. Mentha oil contains not less than 50% of total L-menthol.

* Geographical source :- Mentha cultivated in Europe, Japan, England, France, Italy, USA, USSR, Bulgaria. In India it is cultivated near Jammu and in Farai region of U.P.

* Description

Colour - Colourless to yellow

Odour - Characteristic and pleasant

Taste - Pungent followed by cooling sensation

* Solubility - It is soluble in 70% alcohol, ether and chloroform and insoluble in water.

* Standard - It is neutral to litmus paper.

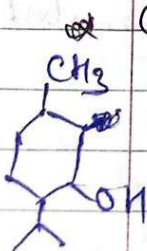
2) Weight per ml is 0.9 to 0.912 g.

3) Optical rotation at 25°C is -16° to -30°

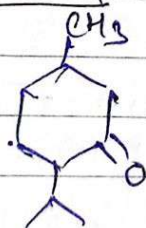
4) Refractive index - 1.459 to 1.465

* Storage - Peppermint oil should be stored in well filled and air tight containers protected from light and in cool place.

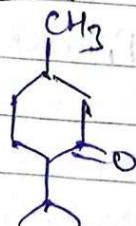
Chemical constituents $\Rightarrow$



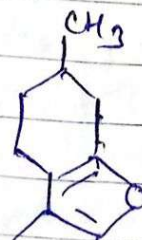
Menthol



Pulegone



Menthone



menthofuran

* Chemical test:- Few drops of peppermint oil are mixed with 5ml of nitric acid solution. (Prepared by adding 1 ml of nitric acid to 300 ml glacial acetic acid. ~~the~~ heat on water bath. Within few minutes liquid develops blue colour, which on further heating deepens and shows copper colour fluorescence. After some time it become golden yellow.

* Use: Peppermint oil is used as carminative, stimulant and flavouring agent.

- It has mild antiseptic properties
- It is used in toothpaste, tooth powders, shaving creams and different pharmaceutical dosage form
- It is also used in preparation of chewing gums, candies, jellies, perfumes and essences.

* Clove:-

Synonyms:- Caryophyllum, clove flower, clove bud.

* Biological source:- Clove consist of dried flower buds of *Eugenia caryophyllus* family - Myrtaceae. It should contain not less than 15% (w/w) of clove oils.

* Geographical source:- It is indigenous to Amboyna and Molucca Islands. It is now cultivated in Zanzibar, Pemba, Penang, Madagascar, Caribbean Islands, Sri Lanka & India. In India, cloves are grown in Nilgiri, Tenkasi hill and in Kanyakumari district of Tamilnadu state. It is also cultivated in Kottayam & Quilon district of Kerala.

* Macroscopic character of clove:-

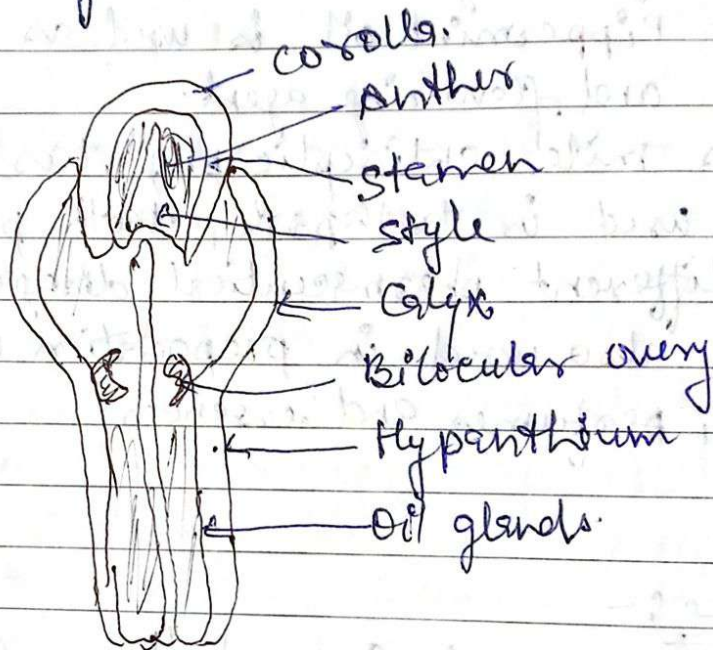
Colour - Crimson to dark brown

Odour - Slightly aromatic

Taste - Pungent and aromatic followed by numbness.

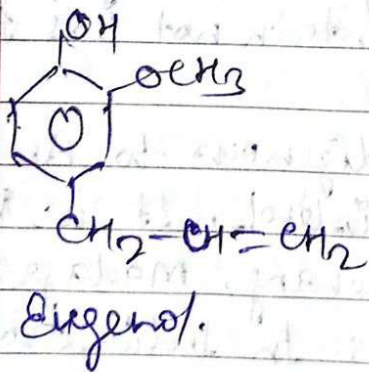
* Size :- About 10 to 17.5 mm in length, 4 mm in width and 2 mm thick.

* Shape - Hypanthium is surmounted with 4 thick acute divergent sepals surrounded by dome shaped corolla. The corolla consist of ~~unexpanded~~ unexpanded membranous petals with several stamens and single stiff prominent style. Cloves are heavier than water.



L.S. of Clove

* Chemical constituent :- Clove contains about 15 to 20% of volatile oil, 10% to 13% of tannin (gallotannic acid), resin, chavicol and eugenin.



- Eugenol (57 to 90%)
- Eugenol acetate
- Caryophyllene
- ester & ketone (small quantity)

* Storage :- Clove and its powder should be stored in air tight container in cool and dry place.

* Chemical test :- If the transverse section of clove is treated with strong potassium hydroxide solution, the needle shaped crystal of potassium eugenate is formed.

* Uses:- clove is used as - dental analgesic, carminative, stimulant, flavouring agent, an aromatic and antiseptic.

- It is used in the preparation of cigarette.
- The oil is used in perfumery and also in manufacture of vanillin.

* FENNEL :-

* Synonyms :- Fennel fruits

* Biological Source :- Fennel consists of dried ripe fruits of the plant known as *Foeniculum vulgare* family - Umbelliferae obtained by cultivation. It contains not less than 1.4% of volatile oil.

* Geographical Source :-

fennel cultivated in Romania, Russia, Germany, France, India and Japan. In India, it is cultivated in Gujarat, Punjab, Maharashtra, U.P., Rajasthan & West Bengal.

* Macroscopic Character :-

Colour - Green to yellowish-brown

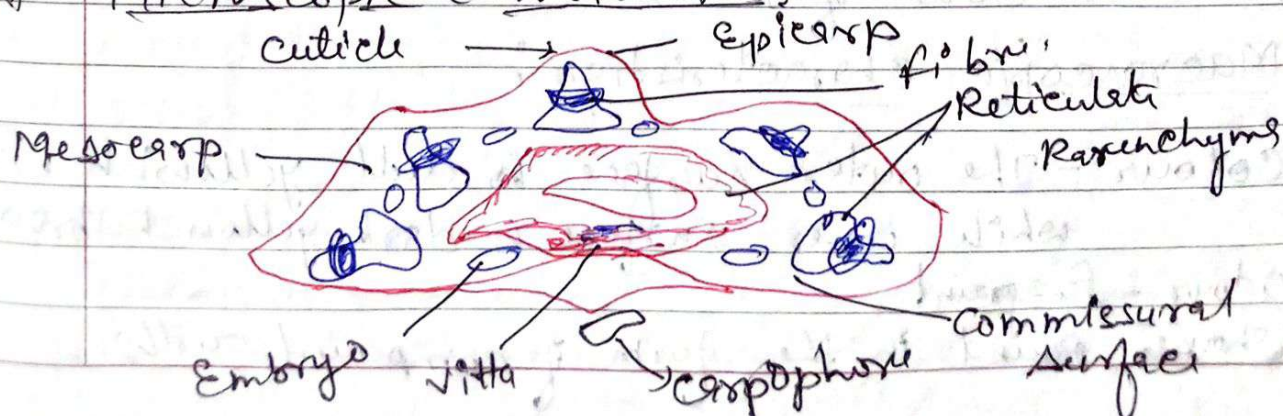
Odour - Sweet aromatic

Taste - Strongly aromatic

Size - 5 to 10 x 2 to 4 mm.

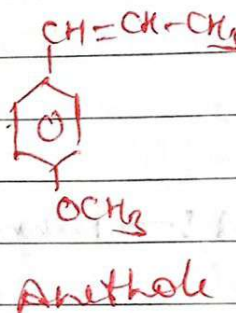
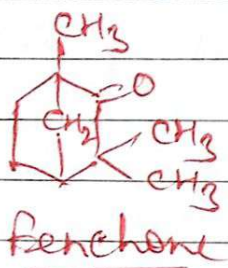
Shape - Straight or slightly curved

* Microscopic Characteristic :-



* Chemical constituent :- Fennel consists of 3 to 7% of volatile oil, about 20% each of proteins and fixed oil.

- Ketone
- Fenchone
- Phenolic ether anethole
- p-menthadiene
- limonene
- methyl chavicol



* Uses :- It is used as a carminative, aromatic and stimulant.

- expectorant & flavouring agent

*

CINNAMON :-

* Synonyms :- Cinnamon bark, Kalmi - Dalchini, Ceylon cinnamon.

*

Biological source :-

Cinnamon consist of the dried inner bark of the shoots of coppiced tree of cinnamon *Zeylanicum* belonging to family - Lauraceae.

*

Geographical source :-

- Its native place Sri Lanka and Malabar coast of India.

*

Macroscopic characteristics :-

Colour - The outer surface is dull yellowish brown, while inner surface is dark yellowish brown.

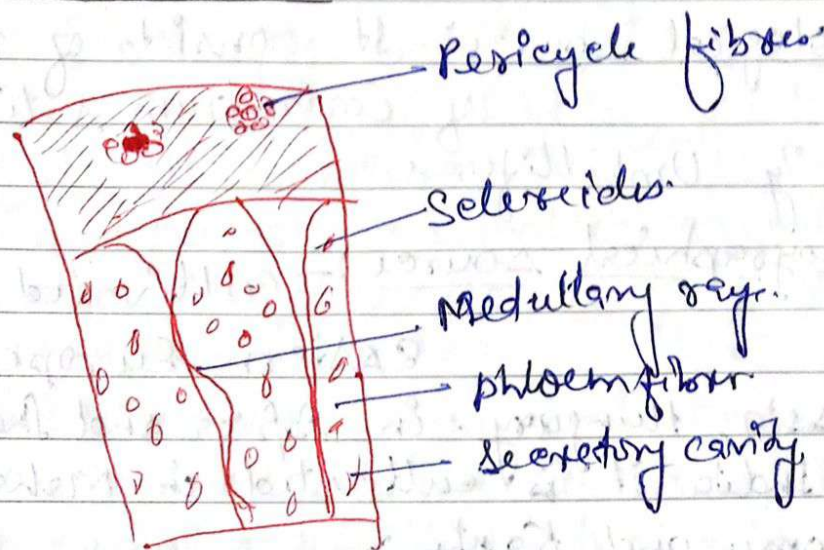
Odour - Fragrant

Shape - found in the form of compound quills

Size - About 1 cm in length and 1 cm in diameter.

Taste - Aromatic and sweet followed by warm sensation

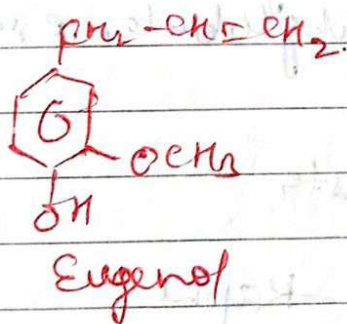
* Microscopic Character:-



T.S. of cinnamon bark

- * Chemical constituents:- Cinnamon bark contains about 0.5 to 1.0% of volatile oil, 1.2% of tannins, mucilage, calcium oxalate, starch and a sweet substance known as mannitol.

→ Cinnamon oil contain - Cinnamaldehyde. (60-70%)



- Eugenol (5-10%)
- Benzaldehyde
- Cinnamaldehyde
- Phellandrene
- Pinene, cymene etc.

* Chemical test:-

On addition of a drop of ferric chloride solution to a drop of volatile oil, a pale green colour is produced.

- With ferric chloride, cinnamic aldehyde gives brown colour and eugenol gives blue colour, resulting in the formation of pale green colour.

* Uses:- Carminative, stomachic & mild astringent, flavouring agent, stimulant, aromatic & antiseptic, used as spice & condiment, dentifrices & perfumes

* CORIANDER:-

* Synonyms:- Fructus coriandri, Cilantro, Coriander fruits.

* Biological source:- It consists of dried ripe fruits of *Coriandrum sativum* belonging to family Umbelliferae.

* Geographical source:- Cultivated in Central and Eastern Europe, particularly in Russia, Hungary. In Africa and India.

- In India it is cultivated in Maharashtra, U.P., Rajasthan, Jammu and Kashmir.

* Macroscopic characters:-

Colour - Yellowish brown to brown

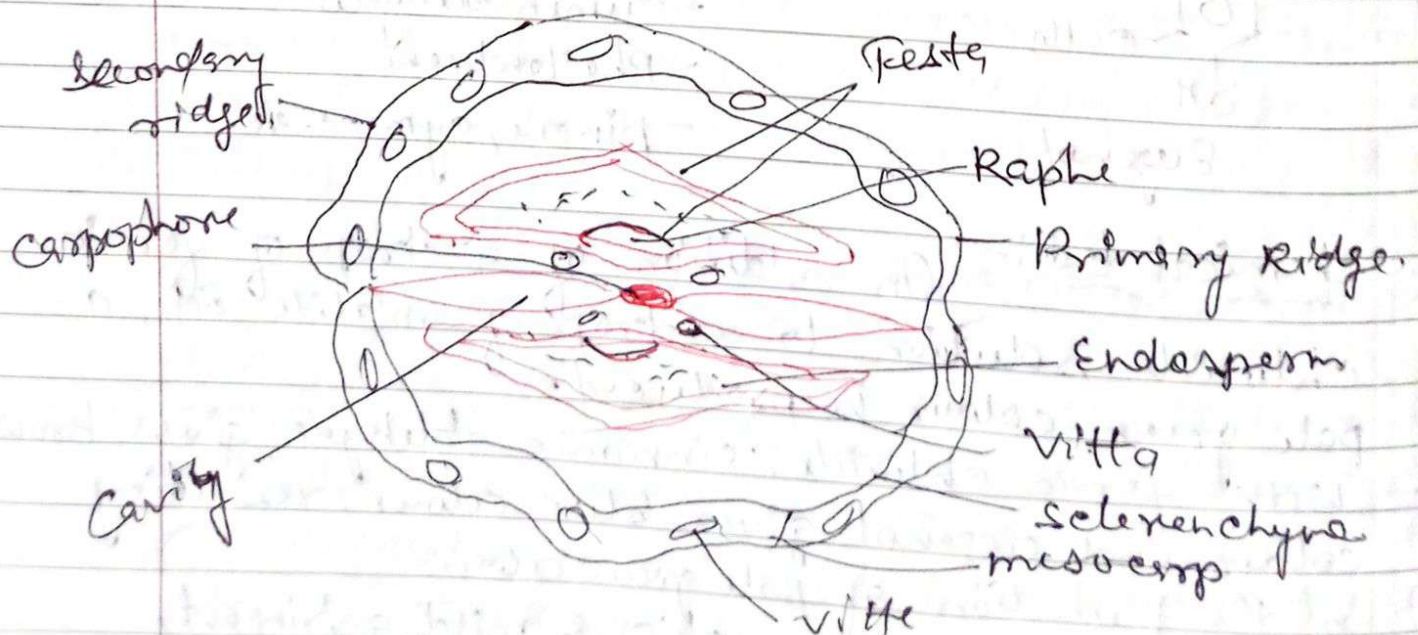
Odour - Aromatic

Taste - Spicy and characteristic

Size - Fruits are 2 to 4 mm in diameter and 4 to 30 mm in length.

Shape - Coriander is a subglobular exocarpous fruit.

* Microscopic characters:-



T.S of coriander fruits

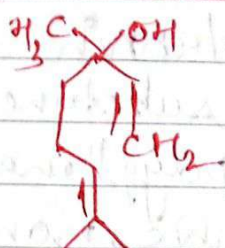


Date _____
Page _____

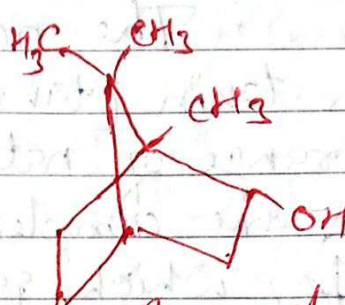
* Chemical constituents :-



p-cymene



Linalool



Borneol

- * Uses :- It is used as - Aromatic, carminative, stimulant, antispasmodic, diaphoretic (sweating heavily) and flavouring agent.
- It is also used as refrigerant, tonic, appetizer, diuretic, aphrodisiac (substance that ↑ sexual desire).
 - It can be applied externally for rheumatism and painful joint.