Essential oils (EOs)

Introduction :-

Essential oils is a concentrated hydrophobic liquid containing volatile aroma compounds from plants.

(or)

EOs are complex mixture of volatile compound-ds produced by living organisms and isolated by physical means only (pressing & distillation) from whole plant or plant part.

→ EOs are also known as volatile oils or ethereal oils, (or) aetherolea, or simply as the oil of the plant from they were extracted eg. oil of clove.

→ An oil is essential in the sense that it contai-ns the essence of the plant fragrance - the characteristic fragrance of the plant from which it is derived.

→ EOs evaporate completely without leaving a stain or residue when dabbed on filter paper.

→ EOs are used in a wide variety of consumer goods such as detergents, soaps, toilet products, cosmetics, pharmaceuticals, perfumes, confectionary food produ-cts, soft drinks, distilled alcoholic beverage (hard drinks) & insecticides.

Essential oil plants are plant species delivering essential oil of commercial interest. 2 important circumstances determine a plant to be used as EO plants are as follows:

(a) Immediate production of oil -

A unique blend of volatiles (oil) like the flower scents in rose (Rosa spp.) Jasmine (Jasminum Sambac spp.), tuberose (Polyanthus tuberosa spp.) etc. produce from flowers and immediately emit the volatiles (oil) by the epidermal layer of their petal. Therefore yield is (even in intensive smelling flowers) very low and special technique is used to recover volatile fragrance compounds (enfleurage)

(b) Secretion and accumulation of oil in specialized anatomical structures, leading to higher concentration of EOs in the plants.

Such anatomical storage structures for EOs can be secretory idioblasts (secretory cells), cavities/ducts or glandular trichomes etc.

→ EOs are soluble in alcohol, ether & fixed oils, but insoluble in water.

→ EOs are generally liquid and colorless at room temperature having characteristic odour, having density less than unity (exception - Cinnamon, sassafras, vetiver etc.), have refractive index & very high optical density.

Difference b/w volatile & fixed oil

Property	Volatile oil	Fixed oil (FO) (consist of esters of ↑ glycerol & fatty acids)
1) Volatilization at ordinary temp.	→ Volatile	→ Non-volatile.
2) Solubility	→ Soluble in organic solvents (ether, $CHCl_3$ & alcohol).	→ limited solubility in organic solvents, almost insoluble in alcohol.
3) Stain on filter paper	Transient (or) no stain	Permanent & greasy
4) Composition	Complex mixtures of hydrocarbon and oxygenated compounds.	Triglycerides ester of fatty acids e.g. palmitic, stearic oleic - - -
5) Long exposure to air & light (Oxidation) respon - se	Resinification	Rancidity
6) Saponification with caustic alkali (KOH)	Negative	Positive

FO consist of esters of glycerol & fatty acid (triglycerides or triacyl gycerols)

Sources of EOs.

Essential oils are generally derived from one or more plants parts eg.

1) Flowers eg. Rose, Jasmine, carnation, Clove, Mimosa, Rosemary, Lavander etc.

2) Leaves eg - Mint, Ocimum spp., Lemongrass, Tamrosa etc.

3) Leaves and Stems eg - Geranium, Patchouli, Petit grain, Verbena, Cinnamon etc.

4) Bark eg - Cinnamon, Cassia, Canella.

5) Wood eg - Cedar, Sandle, Pine

6) Roots eg - Angelica, Sassafras, Vetiver, Saussurea, Valerian etc.

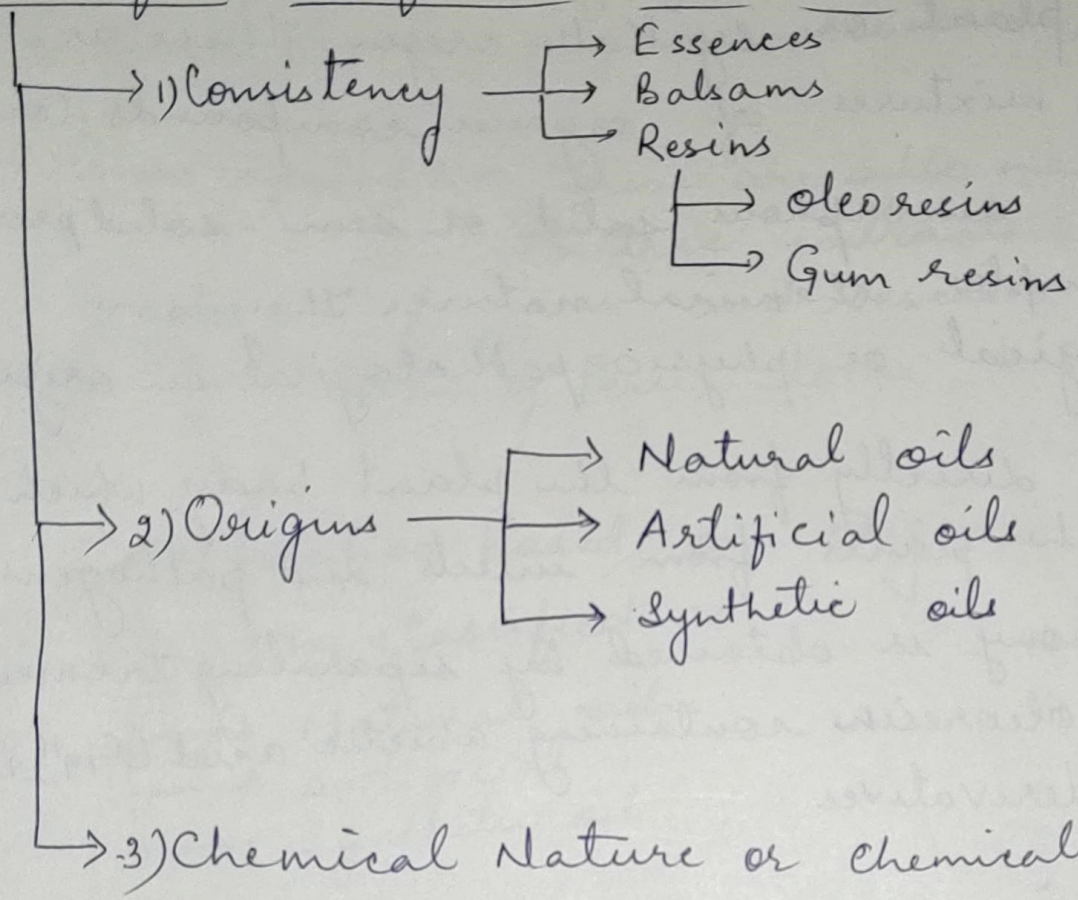
7) Seeds eg - Fennel, Coriander, Caraway, dill, Nutmeg etc.

8) Fruits eg - Bergamot, Orange, lemon, Juniper, apple etc.

9) Rhizomes eg - Ginger, Calamus, Curcuma (terneric) Orris etc.

10) Gum or oleoresins eg Exudations - Eg,- Balsam of Peru, Myroxylon, Storax, Myrrh, Benzoin etc.

Classification of Essential oils



1.) Consistency :-

(a) Essences :-

These are liquids, volatile at room temperature.

eg. rose essence etc
Vanila "

(b) Balsams :- Natural extracts obtained from bushes or trees. These are highly viscous. usually have high benzoic and cinnamic acid content with their corresponding esters or ethers. They are thicker, not very volatile and less likely to react by polymerization.

Eg - Copaiba balsam, Peruvian balsam, Bangay balsam, Tolu balsam, liquid amber etc.

(3) Resins :- Solid or highly viscous substance of plant or synthetic origin. These are generally mixtures of organic compounds. (or)

→ They are amorphous solid or semi-solid products of a complex chemical nature. They are physiological or physio-pathological in origin.

→ Obtained directly from the plant body which protect the plants from insects and pathogens.

eg: colophony is obtained by separating trementine and oleoresin containing abietic acid ($C_{19}H_{29}COOH$) and derivatives

(a) Oleoresins :- These are homogeneous mixtures of resins and Essential oils (EOs)

→ Oleoresins also means vegetable extracts obtained using solvents which should be virtually free of used solvents.

Eg. - Trementine is obtained by making incisions or cut in the trunk of different pine species containing resins (colophony) and EO (trementi-nessence) which are separated by steam drag distillation.

→ Frequently used instead of spices in foodstuffs and pharmacy because of their advantages such as stability, microbiotic and chemical uniformity f. easy to add.

Have aroma of the plant in concentrated form and highly viscous liquid or semisolid substances (Black pepper, paprika oleoresins, Cloves --- etc.)

(b) Gum resins :- These are also natural plant or tree extracts. They are mixture of gums and resins.
eg. Balsam of Peru, storax, benzoin etc.

2) Classification based on origin :-
EOs are classified as
- Natural oil
- Artificial "
- Synthetic oil

(a) Natural EOs :- They are obtained directly from the plant and are not modified physically or chemically afterwards ie. after extraction. However they are expensive because of their limited yield.
eg. Rose oil, clove oil, etc.

(b) Artificial EOs → They are obtained using the process of enriching the essence with one or several of its components.
Eg. Essence of rose, geranium, jasmine etc. are enriched with linalool and aniseed essence with ethanol.
linalool & aniseed are colorless liquid fragrance found in many EO as its constituents.

(c) Synthetic EOs → They are usually produced by combining their chemically synthesized components. These are the cheapest and are thus much more commonly used as fragrance and taste enhancers.
Eg- Vanilla, lemon & strawberry essence etc...

(3) Chemical Nature or chemical compositions

EOs are classified according to their main chemical constituents, which are present in them :-

a) Alcohol EOs - eg Peppermint, Cardamom, Rose, Sandlewood, Coriander etc

b) Aldehydes EOs — Eg - Cinnamon, Lemon Peel, Orange peel, Lemongrass. etc

c) Ester EOs - Eg - Gaultheria, Lavendar, Mustard, Juhi. etc.

d) Hydrocarbon EOs — Eg. Terpentine, Black pepper, White pepper. Pink Pipper

e) Oxide EOs — Eg- Eucalyptus etc.

f) Phenolic-ether EOs — Eg Fennel, Anise, Nutmeg

g) Phenol EOs — Eg Clove, Thyme. etc.