RESINS AND RESIN COMBINATIONS

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Resins and resin combinations

- The term ‘resin’ is applied to more or less solid, amorphous products of complex chemical nature. These are amorphous mixtures of essential oils, oxygenated products of terpenes and carboxylic acids

- Resins and related resinous products are produced in plants during normal growth or secreted as a result of injury to the plants
- They are usually occur in schizogenous or schizolysigenous cavities or ducts

General properties

- Physical characters –
- All resins are heavier than water , they are usually amorphous ,hard, and brittle solids.
- They are insoluble in water and usually insoluble in petroleum ether but dissolve more or less completely in alcohol, chloroform and ether.

- Chemically, resins are complex mixtures of resin acids, resin alcohols (resinols), resin phenols (resinotannols), esters and chemically inert compounds known as resenes.
- Many resins ,when boiled with alkalies yield soaps

- By the action of heat they soften yielding clear, adhesive fluids , Resins burn with a characteristic, smoky flame.
- Resins are often associated with volatile oils (*oleoresins*), with gums (*gum-resins*) or with oil and gum (*oleo-gum-resins*).
- Resins may also be combined in a glycosidal manner with sugars.

Chemical nature :

- Chemically resins are not pure substances but complex mixtures of several resinous substances as resin acids, resin alcohols, resin esters, and neutral resins.
- Resins do not contain nitrogen elements
- (Non nitrogenous compounds)

Classification of resins

- Resins are classified in different three ways:

1. Taxonomical classification, i.e. according to botanical origin, e.g. *Berberidaceae* resins.
2. Classification according to predominating chemical constituent; e.g. acid resins, resene resins, glycosidal resins; etc.

3.Resins may be classified according to the portion of the main constituents of the resin or resin combination; e.g. resins, oleoresins, oleo-gum-resins, balsams.

Classification of resins

- 1. Acid resins –
- Here the resins occur their along with acids. Examples –
- Colophony – Abietic acid
- Sandrac - Sandracolic acid
- Myrrh - Commiphoric acid
- Copaiba - Copaivic acid

- 2. Ester resins –
- This group contains esters as the chief constituents of the resins- Examples
- Benzoin and Storax ,
- Benzoin contains benzyl benzoate,
- Storax contains cinnamyl cinnamate

- 3.Resin alcohols –
- They occurs as in free state or as esters , examples –
- Balsam of peru with perru resino tannol
- Guaiaccum resin with guaic resinol

- They are also further classified into –
  Resins: colophony, cannabis.
- Oleoresins: copaiba, ginger.
- Oleo-gum-resins: asafoetida, myrrh.
- Balsams: balsam of Tolu, balsam of Peru.
- Glycoresins : jalap
- Resenes : Asafoetida, colophony

Balsams

- Balsams are resinous mixtures that contain large proportions of cinnamic acid, benzoic acid or both or esters of these acids.
- The term “balsam” is often wrongly applied to oleoresins and should be reserved for such substances as *balsam of Peru*, *balsam of Tolu* and *storax*, which contain a high proportion of aromatic balsamic acids.

Preparation of resins

- Two general classes of resinous substances are recognized and this classification is based on the method used in preparing them:

1. Natural resins, occur as exudates from plants, produced normally or as result of pathogenic conditions

- Example by artificial punctures e.g. mastic; or deep cuts in the wood of the plant e.g. turpentine, or by hammering and scorching, e.g. balsam of Peru.

2. Prepared resins; are obtained by different methods. The drug containing *resins* is powdered and extracted with alcohol till exhaustion. The Concentrated alcoholic extract is either evaporated, or poured into water and the precipitated resin is collected, washed and carefully dried.

In the preparation of *oleoresins*; ether or acetone having lower boiling point are used. The volatile oil portion is removed through distillation.

When the resin occurs associated with gum (*gum-resins*), the resin is extracted with alcohol leaving the gum insoluble.

Crude drugs containing resins And resin combinations

1. CANNABIS

- Synonym –

- Ganja

- It consists of dried flowering tops of the Biological source – cultivated female plant s of *Cannabis sativa*

- Family - Cannabinaceae

- Diagnostic characters –
- 1.Trichomes – Numerous, both covering and glandular trichomes are present.
- Covering trichomes-
- Unicellur, slightly curved, pointed at one end and enlarged and contains cystolith (Dragger shaped)
- Glandular trichomes – Two types of glandular trichomes are present .

- 1.Multiseriate and multicellur tongue shaped stalk with a globular head.
- Short one celled stalk and 8 celled head
- Chemical constituents -
- It contains 15-20% of resin, which contain major active principle 1,3,4 Tetra hydro cannabinol
- (Commonly known as Δ THC)

- The resin also contains cannabinol, cannabidiol, cannabidiolic acid etc
- Indian hemp seeds contains about 20% fixed oil.
- Uses –
- 1.Sedative
- 2. Narcotic analgesic
- 3.Hypnotic (Induce sleep)

- 4. It has psychotropic properties due to 1,3,4 Tetra hydro cannabinol
- 5.Used as an antibacterial agent

2. Podophyllum

- Synonym – Indian podophyllum
- Biological source –
- It consists of the dried rhizome and root of *Podophyllum hexandrum* (*Podophyllum emodi*)
- Family - Berberidaceae

- Diagnostic characters –
- 1. Sclereids –
- In groups, uniformly thickened and rectangular in shape
- 2. Wood elements –
- Large number of vessels, either entire or fragments of the same showing reticulate thickening

- 3.Starch grains –
- Abundant, simple (Spherical to ovoid) and compound (3-8)
- 4. Parenchyma –
- Parenchyma fully loaded with starch grains

- Chemical constituents –
- It contains 7-15% of resin known as podophyllin . Roots contain more resin than the rhizomes.
- The active principle in podophyllin resin is known as podophyllotoxin(40%) in Indian variety , alpha and β peltatins in the American podophyllum.
- It also contains Quercetin , Kaempferol, astragalin, essential oil

- Uses –
- Used in the treatment of cancer
- Used as purgative
- Used as bitter tonic

3.Ginger

- Biological source –
- It consists of rhizomes of *Zingiber officinalae* the
- Family – Zingiberaceae
- Diagnostic characters –
- 1. Odour – Pleasant aromatic
- 2.Taste - Pungent

- 3. Parenchyma –
- Some of the cells contain yellowish brown oleo-resinous cells which occur either in fragments OR droplets
- 4. Starch grains –
- Characteristic , abundant, simple, ovoid or sack shaped

- 5. Fibres and Vessels –
- Fibres (Non – lignified) in groups associated with vessels
- Chemical constituents –
- It contains 1-2% ofvolatile oil, 5-8% pungent principle, resinous mass and starch

The chief constituent of volatile oil is Zingiberine . It also contains gingerol and traces of shogaol

- Uses –
- 1. Used as stomachic
- 2. Used as an aromatic
- 3. Used as a carminative
- 4. Used as stimulant
- 5.Used as flavouring agent
- 6.Ginger oil is used in mouth washes, ginger bevarages and liquors

4.Capsicum

- Synonym – Chillies
- Biological source –
- It consists of the dried ripe fruits of Capsicum frutescens or Capsicum annum or capsicum minimum
- Family – Solanaceae

- Diagnostic characters –
- 1. Oil globules –
- Abundant and red colored
- 2.Sclerides –
- From the endocarp evenly thickened and pitted (in surface view)
- 3.Epidermis of the testa –
- Unevenly thickened and yellowish green in colour
- (in surface view)

- Chemical constituents –
- It contains an extremely pungent principle Capsaicin, red colouring matter Capsanthin.
- It also contains Ascorbic acid, carotin, red pigments etc

- Uses –
- 1. Used as a spice
- 2. Used as carminative
- 3. Used as nervine stimulant
- 4. Used as a source of vitamin- C
- 5. Used as an appetizer
- 6 . Used as a stomachic
- 7.Externally used as counter- irritant in rheumatism

5.Benzoin

- Synonyms –
- Gum benzoin, Luban, Loban, Sambrani, Lobana (Sumatra benzoin)
- Biological source- Benzoin is the balsamic resin obtained from the incised stem of *Styrax benzoin, Styrax parallelloneurus*
- Family – Styraceae
- Siam benzoin – It consists of balsamic resin of *Styrax tonkinensis,* Family - Styraceae

- Chemical constituents –
- It contains 23% of balsamic acids – Cinnamic acid and benzoic acid
- It contains 70-80% resin consisting of triterpenoids, siaresinolic acid and suma resinolic acid
- It also contains vanillin, sterol, phenyl propyl cinnamate responsible for the aromatic smell

Chemical tests -

- 1. Heat small amount of benzoin slowly in a dry test tube --- melts and evolves white fumes is produced. Which on condensation form crystalline sublimate
- 2.Benzoin heated with potassium permanganate solution --- odour of benzaldehyde (Sumatra benzoin)

- 3. Benzoin is extracted with alcohol and to the extract add water --- milky white solution is formed
- *4. Digest benzoin with few drops of petroleum ether for 5 minutes . Pour 1ml of the etherial solution in a porcelain dish containing 2-3 drops of con. Sulphuric acid and rotate the dish --- reddish brown colour is produced (Benzoin confirmed)

Uses -

- Used as an antiseptic
- Used as an expectorant
- Used as a stimulant
- It is used in the preparation of Compound benzoin tincture

Siam benzoin

- Chemical constituents – It contains about 70% crystalline and 10% amorphous coniferyl benzoate, 10% free benzoic acid, 6% siaresinolic acid, vanillin, cinnamyl benzoate (Absence of cinnamic acid)
- Uses – Antiseptic, expectorant, used in perfumery, cosmotics etc

6. **Asafoetida**

- Synonyms –
- Heeng, hing, hingu
- Biological source – It is the oleo-gum-resin obtained by incising the living rhizomes and roots of Ferula foetida, Ferula asafoetida
- Family - Umbelliferae

Chemical constituents -

- It contains 4-20% of volatile oil, 45-60% of resin and 20% of gum.
- Volatile oil contains Pinene, organic disulphide (isobutylpropenyl disulphide responsible for alliaceous odour)
- Resin contains free asaresinotannaol and in combination with ferulic acid

Chemical tests -

- 1.Powder triturated with water – yellowish orange emulsion is produced.
- *2. Combined umbelliferone test –
- Drug is boiled with hydrochloric acid for 5minutes .It is filtered and ammonia is added to the filtrate – A blue fluorescence is produced

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- 3. Drug is treated with few drops of 50% nitric acid – green colour is produced
- 4. Drug is treated with few drops of sulphuric acid – red colour is produced which changes to violet on washing with water.
- **Uses –**
- As a carminative, an expectorant, an antispasmodic , as a laxative, nervine tonic

7.Colophony

- Synonyms – Chir, long needle pine
- Biological source –
- Colophony is the solid residue obtained after distilling the oleo-resin from various species of pinus- pinus longifolia, pinus palustris, pinus maritima
- Family - Pinaceae

Chemical constituents-

- It contains resin acids – abietic acid , neutral inert substance – resenes, esters of fatty acid.
- Chemical tests –
- 1.Dissolve the powdered drug in 2-3ml of acetic anhydride in a test tube and a drop of con. Sulphuric acid – violet colour is produced

- 2. An alcoholic solution of colophony is acidic to litmus
- 3.Colophony is dissolved in light petroleum and filtered. To the filtrate 2-3 times its volume , dilute copper acetate solution is added – emerald green colour is seen in the petroleum layer (upper layer)

- **Uses –**
- Used in the preparation of plasters and ointments.
- Used in the manufacture of varnishes and disinfecting liquids.

“Talk doesn’t cook rice”. - **Chinese proverb**

THANK YOU FOR YOUR ATTENTION