Antiseptics and disinfectants

"Biocide" is a general term describing a chemical agent, usually broad spectrum, that inactivates microorganisms. Because biocides range in antimicrobial activity, other terms may be more specific, including "-static," referring to agents which inhibit growth (e.g., bacteriostatic, fungistatic, and sporistatic) and "-cidal," referring to agents which kill the target organism (e.g., sporicidal, virucidal, and bactericidal). For the purpose of this review, antibiotics are defined as naturally occurring or synthetic organic substances which inhibit or destroy selective bacteria or other microorganisms, generally at low concentrations; **antiseptics** are biocides or products that destroy or inhibit the growth of microorganisms in or on living tissue (e.g. health care personnel handwashes and surgical scrubs);

disinfectants are similar but generally are products or biocides that are used on inanimate objects or surfaces. Disinfectants can be sporostatic but are not necessarily sporicidal.

SIAM BENZOIN

Biological Source

Siam Benzoin is a balsamic resin derived from stem of *Styrax tonkinensis* Craib., belonging to family Styraceae.

Geographical Source

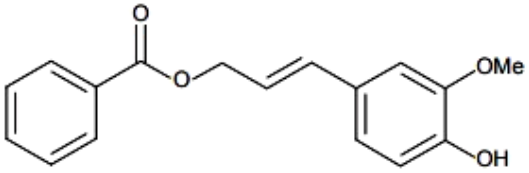
The trees are present in North Laos, North Vietnam, Annam, and Thailand.

Characteristics

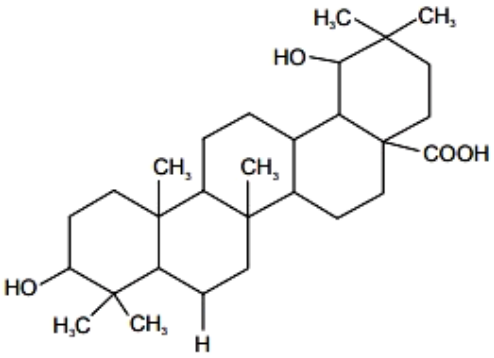
Siam Benzoin occurs as tears or in blocks of variable sizes and reddish brown externally, but milky-white or opaque internally. Matrix is glassy, reddish-brown, resinous, brittle but softening on chewing and become plastic-like on chewing. It has vanilla-like odour and a balsamic taste.

Chemical Constituents

The principal constituent of Siam Benzoin is coniferyl benzoate (60–80%) (3-methoxy-4-hydroxycinnamyl alcohol). Other constituents are free benzoic acid (10%), triterpene siaresinolic acid (6%), vanillin, and benzyl cinnamate.



Coniferyl benzoate



Siaresinolic acid

Chemical Tests

1. Heat Sumatra Benzoin (5 g) with 10% aqueous potassium permanganate solution. A bitter almond-like odour is produced due to oxidation of cinnamic acid present in Sumatra Benzoin. This test is negative in case of Siam Benzoin.
2. To a petroleum ether solution of Benzoin (0.2 g), two to three drops of sulphuric acid are added in a China dish. Sumatra Benzoin produces reddish-brown colour, whereas Siam Benzoin shows purple-red colour on rotating the dish.
3. To alcoholic solution of Benzoin ferric chloride solution is added. A green colour is produced in Siam Benzoin due to the presence of phenolic compound coniferyl benzoate. This test is negative in case of Sumatra Benzoin which does not contain sufficient amount of phenolic constituents.

Uses

Siam Benzoin acts as antiseptic, culinary and expectorant; it is used to prepare benzoinated lard, cosmetics, fixatives, and in perfumery. It is superior to the Sumatra Benzoin with respect to antioxidative effect in lard and other fats.

Marketed Products

It is one of the ingredients of the preparation known as Friar's Balsam.

SUMATRA BENZOIN

Synonyms Gum Benjamin; Benzoinum; Benzoin; Luban (Hindi).

Biological Source

Sumatra Benzoin is obtained from the incised stem of *Styrax benzoin* Dryander and *Styrax parallelo-neurus* Perkins., belonging to family Styraceae. It contains about 25% of total balsamic acids, calculated as cinnamic acid

Geographical Source

The trees are found in Sumatra, Malacca, Malaya, Java, and Borneo.

Styrax benzoin

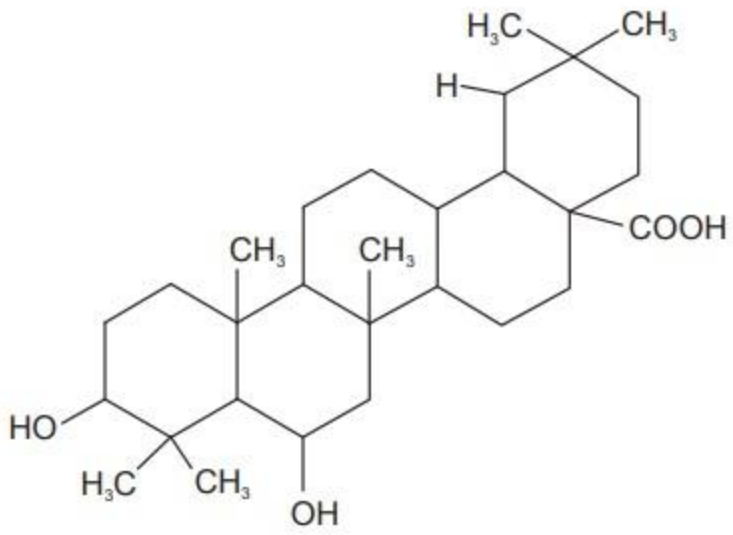
Characteristics

Sumatra benzoin occurs in brittle masses consisting of opaque, whitish, or reddish tears embedded in a translucent, reddish-brown or greyish-brown, resinous matrix. Odour, agreeable and balsamic, taste, slightly acrid. Siamese benzoin occurs in tears or in blocks. The tears are of variable size and flattened; they are yellowish-brown or reddish-brown externally, but milky-white and opaque internally. The block form consists of small tears embedded in a glassy, reddish-brown, resinous matrix. It has a vanilla-like odour and a balsamic taste.

When heated, benzoin evolves white fumes of cinnamic and benzoic acids which readily condense on a cool surface as a crystalline sublimate.

Chemical Constituents

Sumatra Benzoin consists of free balsamic acid (cinnamic and benzoic acids) (25%) and their esters. The amount of cinnamic acid is usually double that of benzoic acid. It also contains triterpenic acids like siaresinolic acid (19-hydroxy-oleanolic acid) and sumaresinolic acid (6-hydroxy-oleanolic acid); traces of vanillin, phenylpropyl cinnamate, cinnamyl cinnamate, and phenylethylene.



Siaresinolic acid

Uses

Sumatra Benzoin possesses expectorant, antiseptic, carminative, stimulant, and diuretic properties. It is used in cosmetic lotions, perfumery and to prepare Compound Benzoin. It forms an ingredient of inhalations in the treatment of catarrh of upper respiratory tract in the form of Compound Benzoin Tincture. Benzoin is used as an external antiseptic and protective, and is one of the main ingredients of Friar's Balsam. It is also used to fix the odour of incenses, skin-soaps, perfumes and other cosmetics and for fixing the taste of certain pharmaceutical preparations. Benzoin retards rancification of fats and is used for this purpose in the official benzoinated lard, also used in food, drinks and in incense.

MYRRH

Synonyms Gum-resin Myrrh; Gum Myrrh; Arabian or Somali Myrrh; Myrrha.

Biological Source

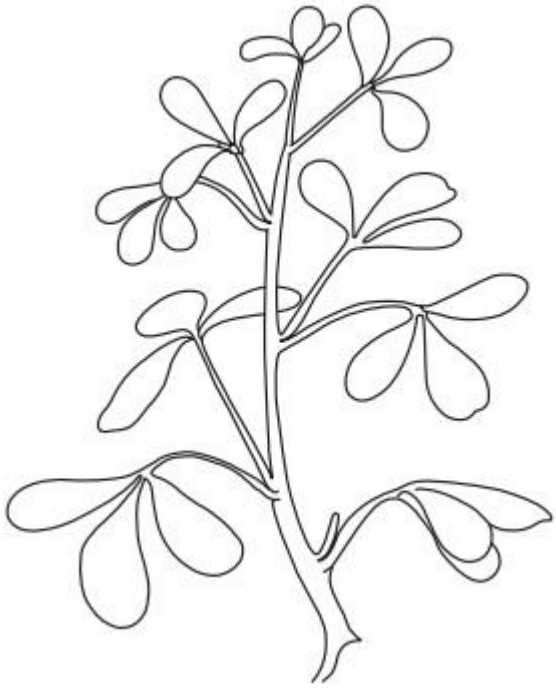
Myrrh is an oleo gum-resin obtained from the stem of *Commiphora molmol* Eng. or *C. abyssinica* or other species of Commiphora, belonging to family Burscraceae.

Geographical Source

It grows in Arabian pennisula, Ethiopia, Nubia, and Somal-iland.

Characteristics

Myrrh occurs as irregular masses or tears weighing up to 250 g. The outer surface is powdery and reddish-brown in colour. The drug breaks and is powdered readily. Fractured surface is rich brown and oily. Odour is aromatic and taste is aromatic, bitter, and acrid.



Commiphora molmol

Chemical Constituents

Myrrh contains resin (25–40%), gum (57–61%), and volatile oil (7–17%). Large portion of the resin is ether-soluble containing α-, β-, and γ-commiphoric acids, resenes, the esters of another resin acid and two phenolic compounds. The volatile oil is a mixture of cuminic aldehyde, eugenol, cresol, pinene, limonene, dipentene, and two sesquiterpenes. The disagreeable odour of the oil is due to mainly the disulphide. The gum contains proteins (18%) and carbohydrate (64%) which is a mixture of galactose, arabinose, glucuronic acid, and an oxidase enzyme.

Chemical Tests

1. A yellow brown emulsion is produced on trituration with water.
2. Ethereal solution of Myrrh turns red on treatment with bromine vapours. The solution becomes purple with nitric acid.

Uses

Myrrh is used as carminative and in incense and perfumes. It has local stimulant and antiseptic properties and is utilized in tooth powder and as mouth wash. Topically it is astringent to mucous membranes. It is used in a tincture, paint, gargle and rinse due to its disinfecting, deodourizing, and in inflammatory conditions of the mouth and throat. Alcoholic extracts are used as fixatives in the perfumery industry.

Allied Drugs

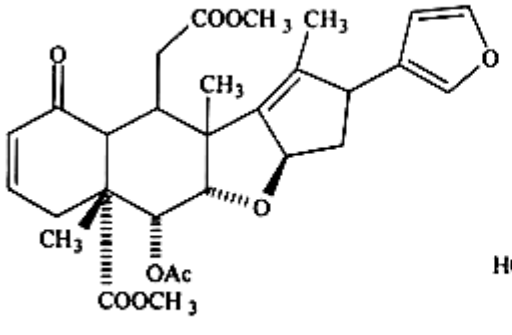
Four different varieties of' bdellium are present. Of these, perfumed or scented bdellium or bissabol is obtained from *C. erythaea* var. *glabrescens.* It resembles soft myrrh in appearance but more aromatic odour and does not give a violet colour.

Marketed Products

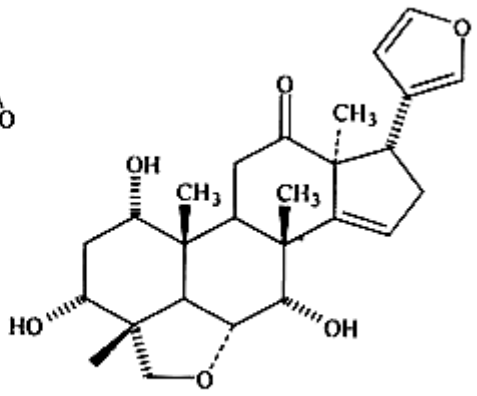
It has been marketed as Guggulipid by CDRI, Lucknow, India. In ayurveda, it is sold as Yograj guggulu (Baidyanath) for antiinflammatory and antihyperlipidemic activity, and it is also a constituent of Madhumehari (Baidyanath).

Neem

Synonyms:*Hin.-Nira, nimb; Mal. – Veppa; Mar. – Limba, Oriya- Nimba; Tam- Vembu.*
Biological Source:
Neem consists of the fresh or dried leaves and seed oil of *Azadirachta indica* J. Juss (*Melia Indica* or *M. azadirachta* Linn.).
Family:*Meliaceae.*
Geographical source:
It is found in India, Pakistan, Sri Lanka, Malaya, Indonesia, Japan, Tropical region of Australia and Africa. In India, it is found in Uttar Pradesh, Maharashtra, Tamil Nadu, Rajasthan, and M.P.
Macroscopical Characters:
1. Leaves:
i. They are imparipinnate, alternate, exstipulate, 3-6 cm long on long slender petioles; leaflets 7-17; alternate or opposite, very shortly stalked, 1-1.5 cm long.
ii. Apex: ovate-lanceolate, attenuate
iii. Base: Unequal.
iv. Colour: Smooth and dark green.
v. Odour: typical.
vi. Taste: Bitter.
2. Fruits:
i. Shape: Ovoid, bluntly pointed, smooth drupe.
ii. Colour: Green (Young and unripe); Yellow to brown (Mature and ripe).
iii. Very scanty pulp and hard bony endocarp.
iv. Solitary with a thick Testa and embryo with foliaceous cotyledons in the axis of scanty endocarp.
3. Seed Oil:
i. Colour: Yellow to brown.
ii. Taste: Bitter.
iii. Odour: Garlic.
Chemical Constituents:
1. Leaves:
i. Nimbin, 6- desacetylnimbinene.
ii. Nimbinene, Nimbandiol, nimbolide.
iii. Quercetin, β-sitosterol.
iv. Ascorbic acid, n-hexacosanol, nonacosane and amino acid.
Nimbin & Nimbidinin



Nimbin



Nimbidinin

2. Fruits:
i. Gedunin.
ii. 7-deacetoxy-7α- hydroxygedunin.

iii. Azadiredione, azadirone, nimbiol.
iv. 17-epiazadiradione.

3. Seeds:

i. Tetranortriterpenoids; 1, 2-diepoxyazadiradiradione,
ii. 7-acetylneotrichilenone, 7-desacetyl-7-benzoyIgedunin
iii. Azadirachtin.

4. Oils:

i. Fatty acid: Myristic acid, palmitic acid, stearic acid, oleic acid and linoleic acid.
ii. Glycerides: Oleopalmitostearin, oleodistearin, odiolein and linoleodiolein.
iii. Bitter principle: Nimbidin, nimbidinin, Nimbin, nimbinin and nimbidol.

Uses:

1. Leaves:

a. Poultice, applied to boils.
b. In worm, jaundice and in skin disease.
c. Ulceration of cow-pox.
d. Insect-repellent.
e. Antiviral and antifungal.

2. Oils:

1. Stimulant, antiseptic.
2. Rheumatism and skin disease.
3. Manufacturing of oleic acid and stearic acid.
4. Antiviral activity.
5. For soap making.
6. Spermicidal.

Curcuma (Turmeric)

Synonyms:

Hindi- Haldi; Bang- Halud; Guj- Halada; Kan- Arisina; San- Haldi, Haridra; Tam- Manjal; Tel- Pasupu,

Biological source:

Turmeric consists of the dried rhizomes of curcuma longa L. (C. domestica Valeton)

Family:Zinziberaceae.

Cultivation:

Plant is a perennial herb; 2-3 ft high with a short stem and tufted leaves; the rhizomes, which are short and thick, constitute the turmeric of commerce. The crop requires a hot and moist climate, a liberal water supply and a well drained soil. It thrives on any soil-loamy or alluvial, but the soil should be lose and friable. The field should be well prepared by ploughing and turning to a depth of about one ft. and liberally manure with farmyard and green manures.

Sets or fingers of the previous crop worth one or two buds are planted 3-inches deep at distance of 11-16 inches from April to August. The crop is ready for harvesting in about 9-10 months when the lower leaves turns yellow. The rhizomes are carefully dug up with hard picks, washed and dried.

Macroscopical Character:

i. Colour- Yellow to yellowish brown externally, yellow to yellow orange internally.

ii. Form- Primary rhizomes ovate, oblongs or pyriform and are called in commerce as bulb or round turmeric; whereas the lateral rhizomes are more cylindrical and often short branched and are they are called long turmeric.

iii. Size- the round form is about half as broad as long. The long forms are about 4 to 7 cm long and 1 to 2 cm wide.

iv. Surface- root scars and annulations are seen.

v. Fracture- Horny.

vi. Odour- aromatic.

vii. Taste- aromatic and bitter.

Chemical constituents:

1. Curcuminoids- Non-volatile colouring matter.

2. Curcumin, a diferuloylmethane; desmethoxy dicinnarmoylmethane; bidesmethoxy curcumin.

3. Volatile oil:

(a) l-cycloisoprenmyrcene,
(b) zinziberene,
(c) turmerone,
(d) a-atlantone,
(e) y-atlantone,
(f) phallandrane,
(g) sabinene, cineole,
(h) borneol
(i) Curcumone.

4. Sugars- arabinose, fructose and glucose.

5. Bitter substances,

6. Fixed oil and acids

Uses:

1. Anti-inflammatory agent.
2. Stimulant, tonic.
3. Aromatic and carminative.
4. Choleretic and cholagogue.
5. Antifertility agent.
6. In respiratory disease.
7. To lower the blood cholesterol level.
8. Externally applied in pains and bruises.
9. As a colouring agent.
10. In cosmetics.
11. Antimicrobial.

Chemical test:

1. Cone. H_2SO_4 or a mixture of H_2SO_4 with alcohol (90%) imparts a deep crimson colour to turmeric.
2. Boric acid colours to reddish brown which on addition of alkalies becomes greenish blue.