

6.1.11. Beeswax (3)

Bees wax is a natural wax obtained from the honey bees of the *Apis* genus. The worker bees produce wax in scales in their abdominal segments by the eight wax-producing glands.

Synonyms

Cera flava, cera alba, mom, madhujan, white bees wax, and yellow bees wax.

Source

Bees wax is the purified wax obtained from the honey comb of the bees *Apis mellifera* and other species of *Apis*.

Family

Apidae

Occurrence and Distribution

On a commercial scale, bees wax is produced in India, Africa, Jamaica, West Indies, and California (USA).

Organoleptic Evaluation

- 1) **Colour:** Yellow to yellowish-brown.
- 2) **Odour:** Agreeable and honey-like.
- 3) **Solubility:** Soluble in hot alcohol, ether, chloroform, carbon tetrachloride, fixed and volatile oils; insoluble in water.
- 4) **Extra Features:** Non-crystalline solid; soft to touch; crumbles and turn to a plastic mass when pressed between fingers; can be given any shape when in molten form; granular fracture.

Chemical Constituents

Bees wax is esters of monohydric alcohols having straight chain acids. About 80% of myricin, i.e., myricyl palmitate is present in bees wax, which is its major constituent. Free cerotic acid (about 15%), melissic acid (in small quantities), and cerolein (aromatic substance) are other constituents.

Chemical Test

Saponification Cloud Test: In this test, 0.5gm of bees wax is boiled with 8ml of 10% NaOH solution for 10 minutes. The original volume is made up and the resultant solution is filtered through glass wool and acidified with HCl. A precipitate forms indicating the presence of fats, fatty acids, or resins.

Therapeutic Efficacy

- 1) It is used in plasters and polishes.
- 2) It is used in ointment for hardening purposes.
- 3) It is an ingredient of paraffin ointment I.P.

6.1.12. Acacia

Acacia is a genus of plant (figure 6.3) including different types of trees and shrubs. Some plants of genus acacia contain toxic chemicals that can potentially cause hair loss, affect GIT's ability to intake nutrients, and cause stunt growth.



Figure 6.3: Acacia Twig

Synonyms

Gum acacia, gum arabic, and acaciae gummi.

Source

Acacia is the dried gummy exudation obtained from the stems and branches of *Acacia senegal* (L.) Willd. or other African species of Acacia. It is also found in the stems and branches of *Acacia arabica*, Willd.

Family

Leguminosae

Occurrence and Distribution

A. senegal is found in the drier parts of Anglo-Egyptian Sudan and the northern Sahara. It is also found throughout the vast area from Senegal to the Red sea and in eastern India. It extends southwards to northern Nigeria, Uganda, Kenya, Tanzania, and Southern Africa.

The tree is found in the dry monsoon forests of India and Sri Lanka. In India, *A. arabica* (babul tree) grows wild in Punjab, Rajasthan, and on Western Ghats.

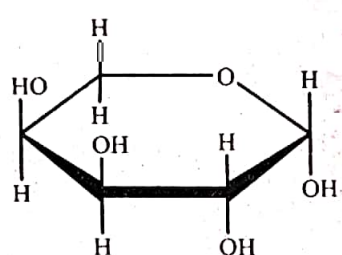
Organoleptic Evaluation

- 1) **Colour:** Tears are white, pale yellow, or creamish brown to red coloured; powder is off-white, pale yellow, or light brown coloured.
- 2) **Odour:** Odourless.
- 3) **Taste:** Bland and mucilaginous.
- 4) **Shape:** Tears are mostly spheroidal or ovoidal.
- 5) **Size:** Tears have a diameter of about 2.5-3.0cm.
- 6) **Solubility:** Soluble in water resulting in a viscous and acidic solution; insoluble in alcohol.

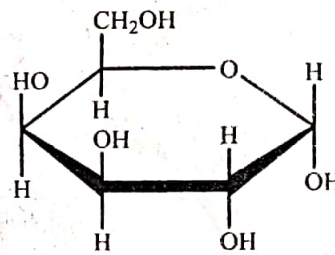
- 7) **Appearance:** Tears are invariably opaque either due to the presence of cracks or fissures produced on the outer surface during the process or ripening; the exposed surface is glossy.
- 8) **Fracture:** Usually very brittle.

Chemical Constituents

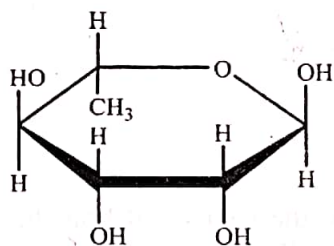
Arabin, a complex mixture of calcium, magnesium, and potassium salts of Arabic acid, is the chief constituent of acacia. Arabic acid hydrolyses into **L-arabinose**, **L-rhamnose**, **D-galactose**, and **D-glucuronic acid**. It also contains oxidase and peroxidase enzymes. Since it contains diastase, it readily converts into powdered guaiacum resin. On drying at 100°C, its moisture content decreases by about 12-14% and it yields 2.7-4.0% of ash.



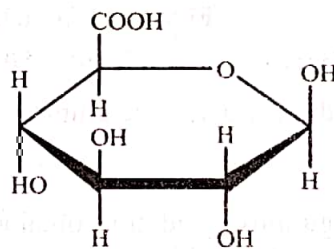
(-)-Arabinose



(+)–Galactose



(-)-Rhamnose



(+)–Glucuronic Acid

Chemical Tests

- 1) **Lead Acetate Test:** On treating an aqueous solution of acacia with lead-acetate solution, a heavy white precipitate is formed.
- 2) **Borax Test:** On treating an aqueous solution of acacia with borax, a stiff translucent mass is formed.
- 3) **Blue Colouration due to Enzyme:** On treating an aqueous solution of acacia with benzidine in alcohol along with few drops of hydrogen peroxide, a distinct blue colour appears due to the enzyme present.
- 4) **Reducing Sugars Test:** On hydrolysing an aqueous solution of acacia with dilute HCl, reducing sugars are obtained. These sugars can be detected by a brick-red precipitate of cuprous oxide which is formed when reducing sugars are boiled with Fehling's solution.
- 5) **Specific Tests:** On treating 10% aqueous solution of acacia with dilute solution of lead acetate, no precipitate is formed (distinction from agar and tragacanth). On treating the same with iodine solution, no change in colour occurs (distinction from starch and dextrin). On treating the same with FeCl₃ solution, a bluish-black colour is not produced (distinction from tannins).

Therapeutic Efficacy

- 1) Its mucilage is a demulcent.

- 2) It is an essential pharmaceutical aid for emulsification and to be used as a thickening agent.
- 3) It is used as a binding agent in tablet formulations.
- 4) It is used in the granulation process of tablet manufacturing due to its compatibility with other plant hydrocolloids, starches, carbohydrates, and proteins.
- 5) It is combined with gelatin to form coacervates for drug microencapsulation.
- 6) It is a colloidal stabiliser.

6.1.13. Tragacanth

Tragacanth is the dried, gummy exudation of *Astragalus* species (figure 6.4). It is a small, low, bushy perennial shrub with large tap root along with the branches. The root is tapped to obtain gum.



Figure 6.4: Tears of Tragacanth

Synonyms

Gum tragacanth, gum dragon, goat's thorn, and hog gum.

Source

Tragacanth is the air dried gummy exudate, either flowing naturally or obtained by incision from the stems and branches of *Astragalus gummifer* Labill and other species of *Astragalus*.

Family

Leguminosae

Occurrence and Distribution

Tragacanth grows indigenously in Iran, Greece, Turkey, Iraq, America, and Syria. Persian tragacanth is obtained from north Syria and Iran; while Smyrna tragacanth is exported from Smyrna port in Asiatic Turkey.

Garhwal, Kumaon, and Central Punjab are the areas in India where few species of tragacanth are available.

Organoleptic Evaluation

- 1) **Colour:** Flakes are white or pale yellowish-white.
- 2) **Odour:** Odourless.
- 3) **Taste:** Tasteless.
- 4) **Shape:** Curved or twisted ribbon-like flakes.
- 5) **Size:** Flakes are 25 × 12 × 12mm in size.
- 6) **Fracture:** Short and horny.
- 7) **Appearance:** Translucent.
- 8) **Solubility:** Partially water soluble; swells in water to form a homogeneous, adhesive and gelatinous mass; insoluble in alcohol.

Chemical Constituents

Tragacanth is made up of two major fractions, i.e., **tragacanthin** (water-soluble) and **bassorin** (water-insoluble). Both these fractions are insoluble in alcohol. These two components can be separated by simple filtration of highly dilute mucilage of tragacanth.

Bassorin is present in 60-70% and tragacanthin in 30-40% concentrations. Bassorin when brought in contact with water, becomes swollen forming a gel; while tragacanthin forms an instant colloidal solution with water.

Tragacanth gum also contains sugars and uronic acid units, and can be divided into **three types of constituents**:

- 1) An acidic constituent is tragacanthic acid which hydrolyses into galactose, xylose, and galacturonic acid,
- 2) A neutral polysaccharide hydrolyses into galactose and arabinose, and
- 3) A steroidal glycoside.

Chemical Tests

- 1) On boiling tragacanth solution with few drops of 10% aqueous ferric chloride solution, a deep yellow precipitate forms.
- 2) On dissolving tragacanth and precipitated copper oxide in concentrated ammonium hydroxide, a stringy precipitate forms.
- 3) On warming tragacanth with sodium hydroxide solution, canary yellow colour develops.
- 4) On treating tragacanth with strong iodine solution, green colour develops.
- 5) On placing tragacanth in water, a small fraction of it gets dissolved and the remaining swells to form a gelatinous mass.
- 6) On boiling an aqueous solution of tragacanth with conc. HCl, red colour does not develop.
- 7) On adding ruthenium red solution (0.1% in H₂O) to powdered gum tragacanth, the particles will neither attain a pink colour nor will get lightly stained.
- 8) On treating tragacanth with lead acetate, a heavy precipitate forms.

Therapeutic Efficacy

- 1) It is used as a demulcent in cough and cold preparations.
- 2) It is used to treat diarrhoea.
- 3) It is used as an emollient in cosmetics.
- 4) It is used as a thickening, suspending, and an emulsifying agent for oils and waxes.
- 5) It is combined with acacia to be used as a suspending agent.
- 6) Its mucilage is used as a binder in tablet formulations and also as an excipient in pills.
- 7) In powdered form it is used as an adhesive.
- 8) It is used in lotions for topical use and also in spermicidal jellies.
- 9) It imparts consistence to troches.
- 10) It has been reported to inhibit *in vitro* and *in vivo* growth of cancer cells.