

## **5.4. ASTRINGENTS**

### **5.4.1. Introduction**

Astringents are a group of substances which causes contraction or shrinkage of body tissues, and also dries the body secretions. The term **astringent** has been derived from a Latin term *adstringere* which means **to bind fast**.

### **5.4.2. Pale Catechu**

Pale catechu is an extract occurring as dark or pale-brown coloured cubes having a dull, powdery fracture. It may also occur in the form of lozenges.

**Synonyms**

Gambier, Pale Catechu, Terra Japonica, and Catechu.

**Biological Source**

Pale catechu is an extract prepared from the leaves and young shoots of *Uncaria gambier* Roxburg.

**Family**

Rubiaceae

**5.4.2.1. Occurrence and Distribution**

This plant is a climbing shrub (figure 5.17) and is indigenous to the Malaya Archipelago and largely cultivated on the small islands between Singapore and Sumatra as well as in British North Borneo and on other islands of the Archipelago. The drug was introduced into Europe towards the end of the 18<sup>th</sup> century, but was probably used in India during the primitive era for chewing with betel leaf (the leaf of *Piper betel* Linn).



Figure 5.17: *Uncaria Gambier* (Herb)

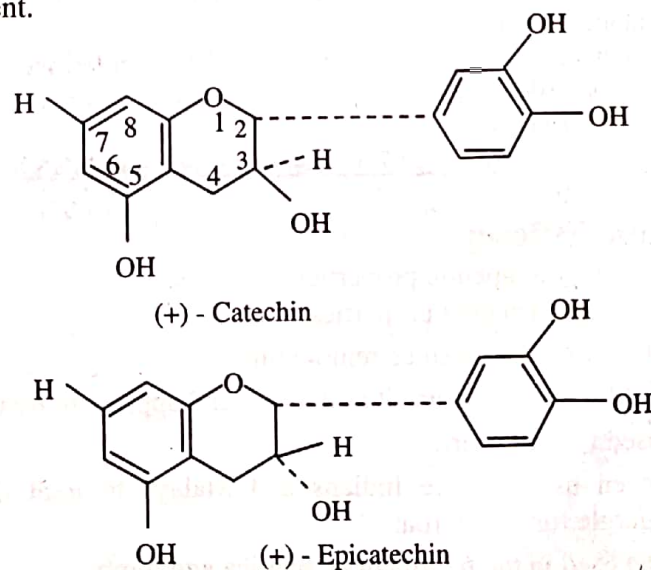
**5.4.2.2. Organoleptic Evaluation**

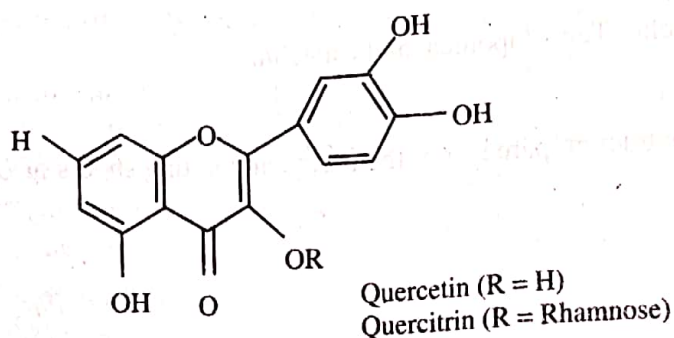
The organoleptic features of pale catechu are:

- 1) **Form:** Regular cubes measuring from 2-3cm each way or in masses of adherent cubes and sometimes in larger rectangular blocks about 4cm long or in irregular broken pieces.
- 2) **Colour:** Dark reddish-brown.
- 3) **Odour:** Odourless.
- 4) **Taste:** First bitter and astringent, but afterwards sweetish.

**5.4.2.3. Chemical Constituents**

Pale catechu contains about 7.33% (+) catechin and 22-50% catechutannic acid. These two substances in varying proportions constitute together over 60% of the drug. Catechutannic acid gives a green colour with the solution of ferric chloride, indicating a phlobatannin. Brown substance, rubinic and japonic acids, of unknown chemical nature are also present.





Other constituents of the drug are catechu-red, quercetin, and gambier fluorescin (a fluorescent substance).

#### 5.4.2.4. Chemical Tests

Pale catechu gives the chemical tests illustrated in table 5.1:

Table 5.1: Chemical Tests of Pale Catechu

Experiments	Observations	Constituents for Test
1) <b>Gambier Fluorescent Test:</b> A little powdered drug is boiled with alcohol, filtered, and sodium hydroxide solution is added to the filtrate, stirred, and a few ml of light petroleum is added.	Petroleum layer shows green fluorescence.	Due to the presence of fluorescence constituent.
2) <b>Chlorophyll Test:</b> The powdered drug is boiled with 5ml chloroform on a water bath, filtered in a white porcelain dish, and evaporated in a water bath.	A greenish yellow residue.	Due to the presence of chlorophyll; chlorophyll is absent in black catechu, thus this test is negative.
3) <b>Matchstick Test:</b> A matchstick is dipped in decoction of pale catechu, dried in air, dipped in concentrated hydrochloric acid, and warmed near the burner.	Magenta or purple colour is produced.	By the action of hydrochloric acid on catechins or catechol tannins, phloroglucinol is produced which with lignin of the matchstick respond positively to the test.
4) <b>Vanillin Hydrochloric Acid Test:</b> The drug is treated with vanillin hydrochloric acid reagent, which is a mixture of vanillin (1gm), alcohol (10ml), and concentrated hydrochloric acid (10ml).	Pink or red colour is formed.	Due to the formation of phloroglucinol.

#### 5.4.2.5. Therapeutic Efficacy

Pale catechu has the following therapeutic properties:

- 1) All parts of the plant have astringent properties.
- 2) In India, it was used as skin lotions since remote times.
- 3) The Malays (ancient Malaysia) also use it as a lotion and apply it to treat burns.
- 4) In paste form, it is used to treat scurf.
- 5) It has commonly been used by the Indians and Malays to treat diarrhoea and dysentery, and as a gargle for sore throat.
- 6) In Borneo, it has been used in the treatment of sciatica and lumbago.

### 5.4.3. Black Catechu

Black catechu occurs in black, shining pieces or cakes, and is sold under the name of Catechu. It grows in deciduous trees reaching up to a height of 9-12m. This plant has short hooked spines and bipinnately compound green leaves with 50 pairs of feather-like leaflets.

#### Synonyms

Catechu, Catechu Nigrum. Cutch Khadir (Sanskrit), Katha (Hindi), Katha (Gujarati), Cashoo, Peru catechu, and Cachou.



Figure 5.18: Twig of Catechu Herb

#### Biological Source

Black catechu is the dried aqueous extract obtained from the heart wood of *Acacia catechu*.

#### Family

Leguminosae

#### 5.4.3.1. Occurrence and Distribution

The tree is a native of India and also found in Myanmar.

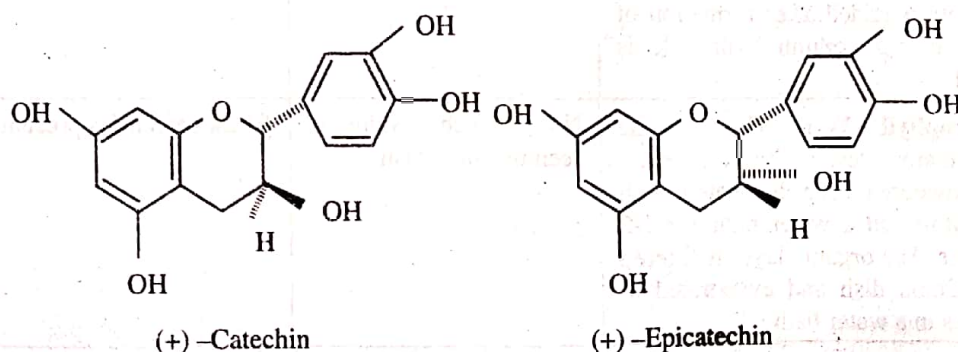
#### 5.4.3.2. Organoleptic Evaluation

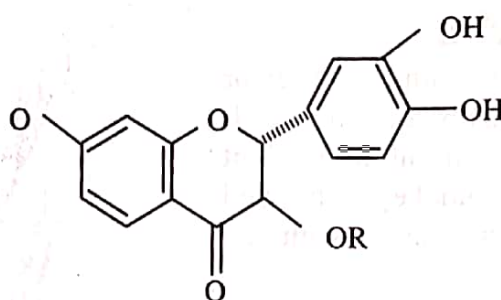
The organoleptic features of black catechu are:

- 1) **Form:** Black irregular mass, outer surface is rough and dull and rarely glossy.
- 2) **Colour:** Black.
- 3) **Odour:** Odourless.
- 4) **Taste:** Bitter in the beginning and astringent afterwards.
- 5) **Fracture:** Hard and brittle and the broken surface is dark brown with a dull gloss and porous.
- 6) **Solubility:** Partially soluble in cold water and alcohol, and completely soluble in hot water.

#### 5.4.3.3. Chemical Constituents

Black catechu contains tannic acid (7.5-35%), catechin (10-15%), acacatechin (2-12%), phlobatannin (25-35%), gum (20-30%), and quercitrin. Minor constituents of black catechu are quercitin, catechu red, and moisture.





Quercetin (R = H)

Quercitrin (R = Rhamnose)

**Acacatechin** contains (–) epicatechin which is the *trans*- form of acacatechin. During the extraction of heartwood chips with boiled water, epicatechin undergoes epimerisation and racemisation to dl,-acacatechin.

#### 5.4.3.4. Chemical Tests

Black catechu gives the chemical tests illustrated in table 5.2:

Table 5.2: Chemical Tests of Black Catechu

Experiments	Observations	Results
1) <b>Gambier Fluorescent Test:</b> Drug is boiled with 2ml of ethyl alcohol, added with 2ml of NaOH solution, followed by 2ml of petroleum ether, contents are shaken and allowed to settle.	Petroleum layer does not show greenish colour.	Black catechu is present.
2) <b>Matchstick Test:</b> Woody side of matchstick is dipped in solution of tannins, air dried, dipped in conc. HCl and warmed over the flame of burner.	Magenta/purple coloured is obtained.	Black catechu may be present phloroglucinol drug + HCl → phloroglucinol + lignin → magenta colour
3) <b>Vanillin Hydrochloride Test:</b> The powdered drug is added with a few drops of vanillin hydrochloride reagent.	Pink or red colour is observed.	Due to the formation of phloroglucinol indicating presence of tannins.
4) <b>Lime Water Test:</b> Few drops of fresh aqueous extract of the drug are added to lime water (10ml).	A brown colour is produced and on standing for 3 minutes a precipitate is formed.	Black catechu is present.
5) <b>Ferric Ammonium Sulphate Test:</b> To an aqueous solution of drug (2%), solution of ferric ammonium sulphate is added after formation of green colour sodium hydroxide is added.	Green colour changes to purple colour.	Black catechu is present.
6) <b>Chlorophyll Test:</b> This is the confirmatory test of black catechu; the powdered drug is heated with chloroform in a water bath for 1-2 minutes. The organic layer is filtered in a China dish and evaporated to dryness in a water bath.	No greenish residue is seen in China dish.	Black catechu is present.

### 5.4.3.5. Therapeutic Efficacy

The therapeutic uses of the black catechu are as follows:

- 1) **Internal Uses:** These include:
  - i) It possesses cooling and digestive properties, hence used in GIT disturbance.
  - ii) It is used in relaxed conditions of throat, mouth, and gums.
  - iii) It is also used in cough and diarrhoea.
- 2) **External Uses:** These include:
  - i) It is used as an astringent (property to precipitate the body protein).
  - ii) It is applied to ulcers, boils, and skin eruptions and in a number of medicinal preparations.

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