



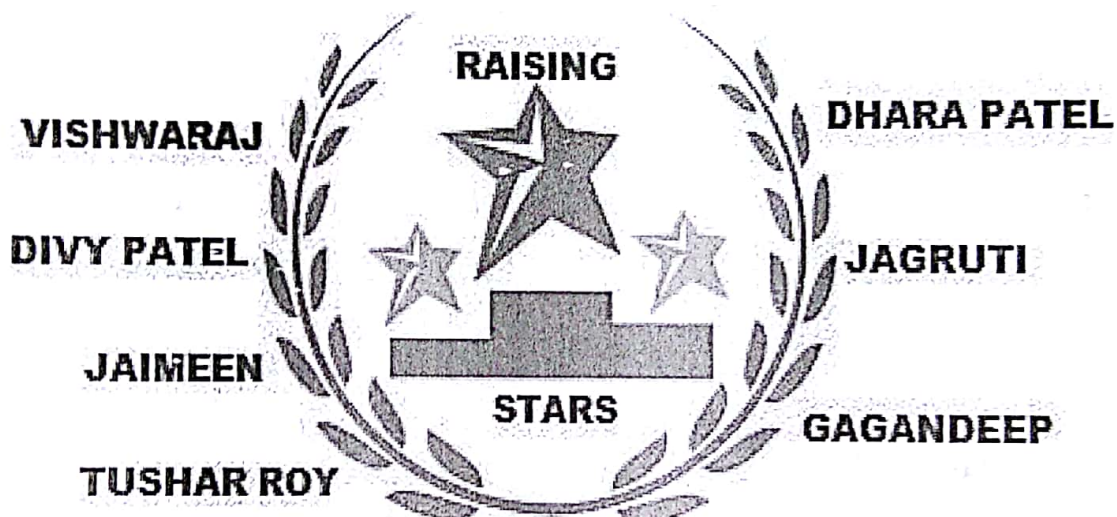
RAISING STARS.



““ We All Are one & One For All ””



SUBJECT- PHARMACOGNOSY



Chapter- TANNIN'S

Notes Made Under Guidance Of

KUNJAL VEGAD.

Notes made by..... **VISHWARAJ.**



“If you light a lamp for somebody, it will also brighten your path.”



Tannins



PAGE NO.

DATE

"Tannins are High molecular weight ; Polyphenolic ; Non-nitrogenous organic compound obtained from plants."

→ Tannins were first discovered by Seguin in 1876.

'Tan' $\Rightarrow$ to convert skin into leather
↳ property is called 'Tanning'

Chemical Properties -

- Solubility - Soluble in water, alcohol and dilute alkalis
- insoluble in organic solvents
- Odour - mostly odourless
- Taste - Astringent
- They are non-crystalline & ~~comp~~ amorphous compound.
- They have tendency to convert skin to leather.

→ It precipitates :-

i) Proteins

→ so used in treatment of ulcer.

ii) Heavy metals

→ so used as an Anti-dote in Heavy metal poisoning

iii) alkaloids

→ With $\text{FeCl}_3 \Rightarrow$ Blue, black or green colour.

→ With Gelatin $\Rightarrow$ White ppts

→ With Potassium Ferricyanide $\Rightarrow$ deep red colour

→ It is carcinogenic [cancer producing] if used for longer time.
Ex- Tobacco

→ It act as 'Anti-septic' due to polyphenolic in nature



Classification

Tannins

True tannins

Pseudotannins

Hydrolysable

Condensed

→ Shows Goldbeater's skin test positive

→ complex polyphenolic

→ High mol. wt.

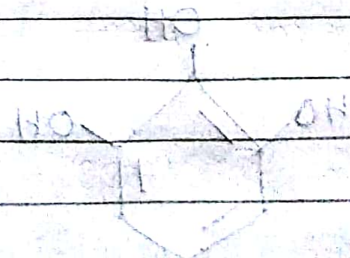
→ Two types

→ Hydrolysable
→ Condensed

→ shows Goldbeater's skin test negative

→ simple phenolic

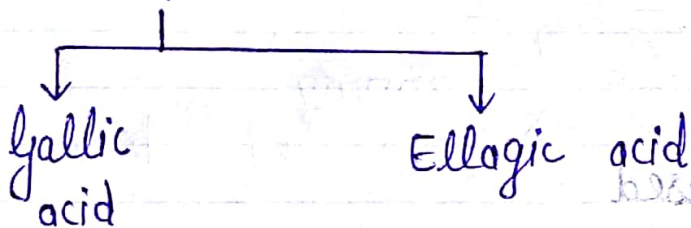
→ Low mol. wt.



Hydrolysable Tannins

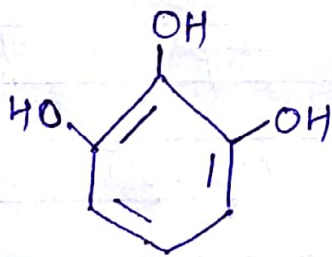
1) Hydrolysed by acid or base or enzyme like 'Tannase'.

2) It is formed by ester linkage between Phenolic ϕ and glucose



3) Also known as Ellagitannins and Gallitannins.

4) On Dry distillation $\Rightarrow$ 'Pyrogallol'



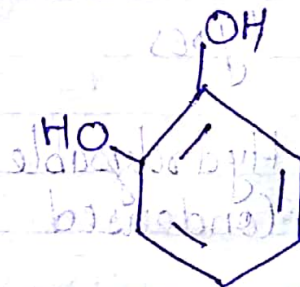
Condensed Tannins

1) It is not hydrolysed by acid or base or enzyme

2) It is formed by condensation of Catechin units.

3) Also known as Phlobaphenes.

4) On Dry distillation $\Rightarrow$ 'Catechol'





5) With $\text{FeCl}_3 \Rightarrow$

Blue Fluorescence

6) Examples $\Rightarrow$

- Amla
- Harde
- Behda
- Galls

5) With $\text{FeCl}_3 \Rightarrow$

Green Fluorescence

6) Examples $\Rightarrow$

- Pale Catechu
- Black Catechu
- Ashoka
- Bael
- Pterocarpus

* Chemical Test

1) FeCl_3 Test

Tannins + FeCl_3

Blue Fluorescence
[Hydrolysable]

Green Fluorescence
[Condensed]

2) Gelatin Test-

0.5-1% tannin solution

+ 1% gelatin and 10% NaCl

↓
White buff ppts

3) Phenazone Test-

5 mL of an aqueous solution of tannin
+ 0.5 gm of sodium acid phosphate

↓
Warm

↓
Cool

↓
Filter

Take filtrate + 2% phenazone

↓
Bulky coloured ppts



4) Gold-beater's skin test -

Take a small skin of an Ox
[from intestine]

↓
Soak in 2% HCl solⁿ

↓
Rinse with distilled water

↓
Place in tannin solution for 5 min

↓
Rinse with distilled water

↓
Transfer in $FeCl_3$ solution

↓
Brown/Black colour ↓ skin shown presence
of Tannin

↓
It is converted to leather.

5) Matchstick's test -

A matchstick ~~is used~~ (A)

↓
Dip in HCl solution, dry it

↓
Dip in tannin solution

↓
Keep under flame

↓
Pink colour flame!

6) Vanillin - HCl test -

→ Ratio of Vanillin : alcohol : conc. HCl
[1 : 10 : 10]

↓
Tannin solution

↓
Red / Brown to pink colours



Drugs containing Hydrolysable Tannins

1) Amla

[Phyllanthus, Indian gooseberry, Amalaki]

B.S. - It is dried, ripened and fresh fruit of 'Emblica officinalis'.

Family - Euphorbiaceae.

C.S. - India, Ceylon, China, Sri Lanka & Myanmar.

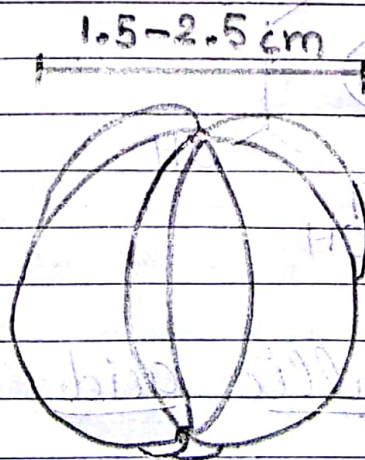
Morphology -

Colour - green to light yellow

Odour - odourless

Taste - sour and astringent

Size - 1.5 - 2.5 cm in diameter

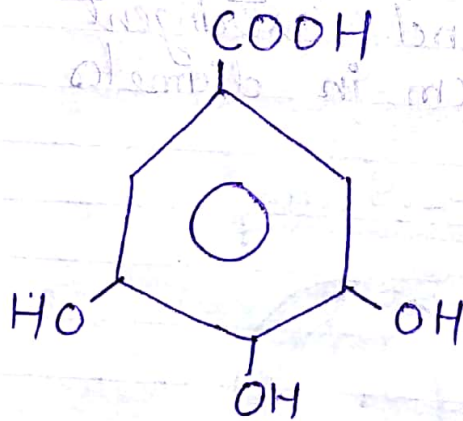


Cultivation and collection -

- Plant is found in deciduous forest.
- Tree bears different male and female flowers.
- After ripening, fruit is collected.

C.C →

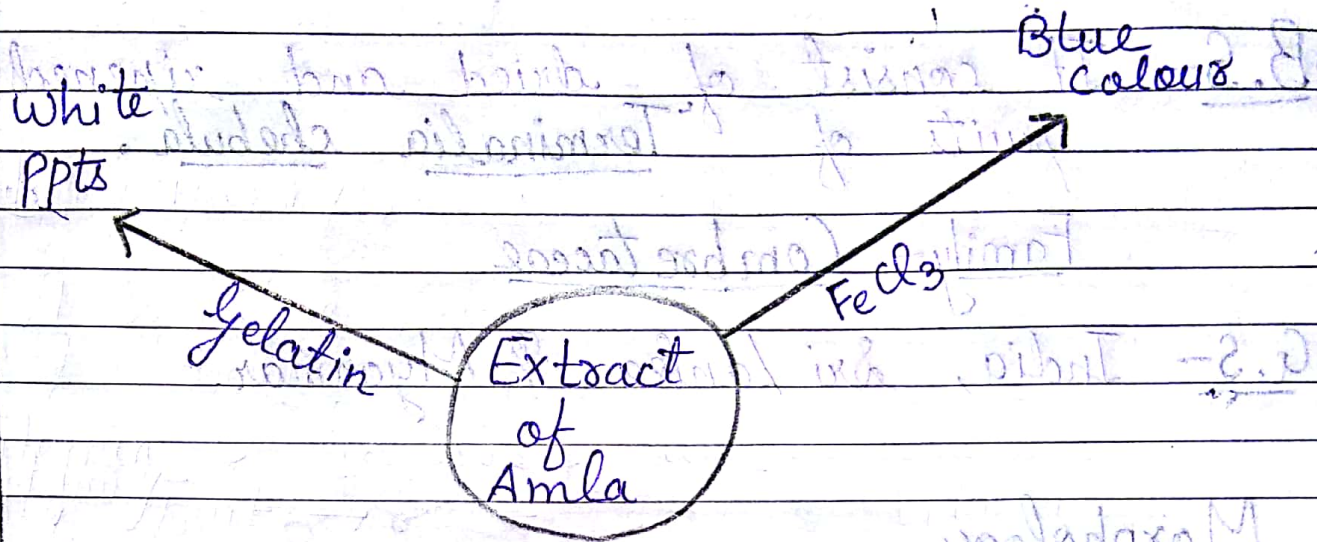
- Vitamin C [Ascorbic acid]
- 10g fruit → 600-900mg of Vitamin C.
- Pectin
- contains glucose
 - gallic acid
 - phyllembin
 - ellagic acid



Gallic acid



Chemical Test -



Uses -

- due to Vitamin C, used in treatment of scurvy.
- useful in treatment of -
 - diabetes
 - diarrhoea
 - hemorrhage
 - anemia
 - Jaundice
- used in preparation of Hair-care products
- used in liver disorders
- Major constituent of Triphala cheurna
- used in ayurvedic preparation of "Chyawanprash".

2) Harde [Chebulic Myrobalan]

[Haritaki, Chebulic Myrobalan]

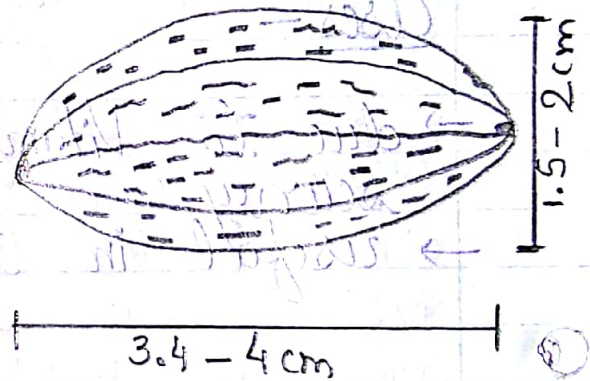
B.S - It consist of dried and ripened fruits of Terminalia chebula.

Family - Combretaceae

G.S - India, Sri Lanka & Myanmar.

Morphology -

- Shape - oval
- Size $\rightarrow$ 3.4 - 4 cm length
1.5 - 2 cm width
- Surface $\rightarrow$ hard
- having longitudinal ridges
- Basal portion is narrower and elongated tapering.
- Colour - light brown
- Odour - odourless
- taste - astringent



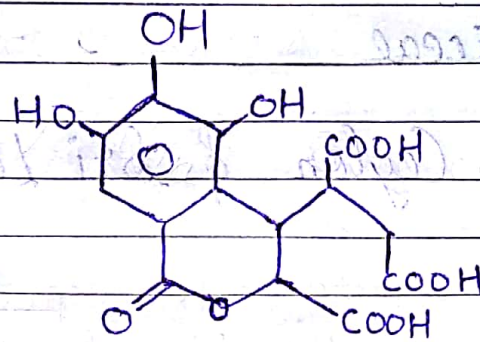
C.C -

- It contain 20 - 40% of hydrolysable tannins.



- Upon hydrolysis of tannins we get,

Chebolic acid + D-galloyl glucose.



Chebolic acid

- also contain gallic acid, Ellagic acid and chebulonic acid.
- It contain resin myrobalanin
- Sugar moiety $\rightarrow$ sucrose, glucose, fructose, sorbitol.

Uses-

- It is one of the imp. constituent of Triphala churna
- used as purgative
- used in treatment of chronic ulcer, wound, piles & gastritis
- also used in dental preparation

3) Behda [Belleric Myrobalan]

[Bibhitaki, Belleric Myrobalan]

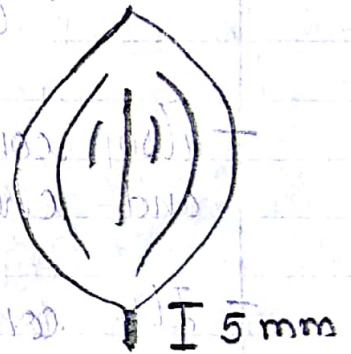
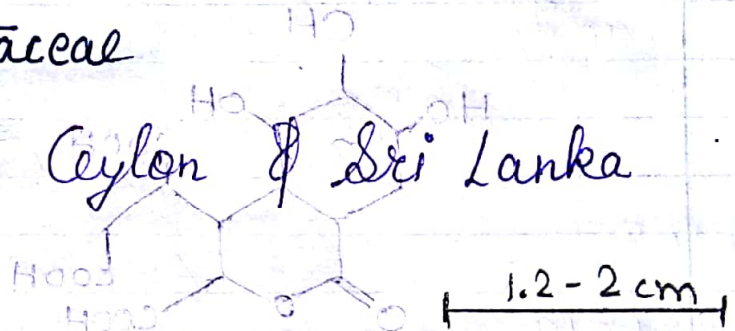
B.S. - It consists of dried and ripened fruits of Terminalia bellerica.

Family - Combretaceae

G.S. - India, Burma, Ceylon & Sri Lanka

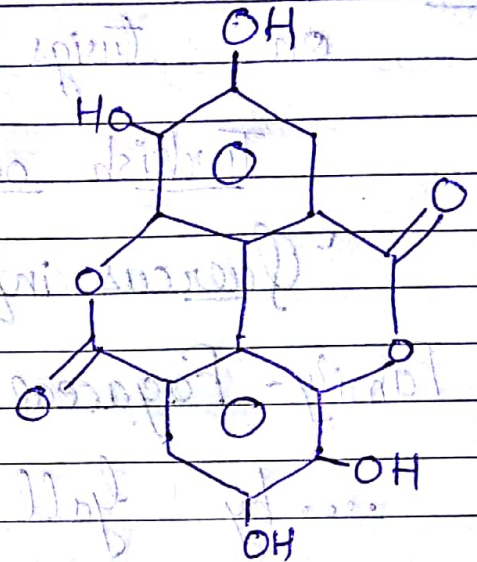
Morphology -

- Type of fruit - Drupe
- Shape - spherical to ovoid
- Size - 1.2 - 2 cm in diameter
- Colour - dirty brown
- Surface - It contains 5 prominent ridges
- Lower part shows pedicel
- Fruit is very hard, when broken it is yellow in colour
- Odour - odourless
- Taste - Astringent



C.C - 20-30% of hydrolysable tannins

- Gallic acid
- Ellagic acid
- Chebullogenic acid
- Sugar → galloyl glucose
 - fructose
 - Rhamnose
 - Mannitol
- Phyllembin



Ellagic acid

Uses-

- used as purgative & Laxative
- imp. constituent of Triphala churna
- used as anti-diabetic
- used in liver disorders.

4) Galls

[Majufal, Mayan]

B.S- It is a pathological outgrowth formed on twigs of Oak tree....

Turkish oak

Quercus infectoria

Family - Fagaceae

Japanese Oak

Rhus chinensis

Family - Anacardiaceae

.... by Gall Wasp 'Cynips tinctoria'

Family - Cynipidae

.... by laying eggs in the twigs.

G.S- Japan, Turkey, China.

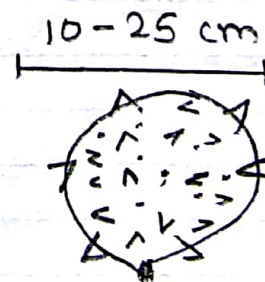
Morphology-

Shape - spherical with short basal stalk

Size - 10-25 cm in diameter

Surface - Numerous projection found in surface

- hard & heavy
- colour - Yellowish-brown
- taste → astringent





Cultivation and collection-

In early summer, gall wasp lays their egg on the twigs.



Larvae come out from the eggs.



Larvae penetrate into epidermis of twigs.



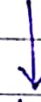
secrete enzyme from mandible which stimulate growth of tissue.



Enclose whole larvae and produce round projecting galls.



It remain in it for 5-6 month.



converted in full wings insect.



Insect come out by breaking the galls.



But pre-mature galls are collected before insect come out.

C.C-

Turkish

- 40-60% Tannic acid
- Gallic acid
- Ellagic acid

Japanese

- 75% Tannic acid
- Gallic acid $\Rightarrow$ 7-10%
- has glucose moiety

Uses-

- used as astringent
- used in preparation of tannic acid.



Drugs containing Condensed Tannins

1) Pale Catechu

[Gambier catechu]

B.S. - It is a dried, aqueous extract prepared from leaves & shoots of....
'Uncaria gambier'

Family - Rubiaceae

G.S. - Malaya, Indonesia

Cultivation and collection - [Coping method]

- Seed source in nursery beds, when they are 9 months old, they are transplanted to actual field at about 3 meters away from each other.
- Plant grows well in direct sunlight
- 1st crop is collected when tree is 2 yrs old & approximately 6 meters height.
- Leaf and young twigs are collected, best crop is obtained when it is 8 yrs old, & crop is continuously obtained up to 20 yrs.

Preparation-

Young leafy branches placed in a Pot

Pot is $\frac{3}{4}$ th full of boiling water

Material is heated for 3 hrs with continuous stirring by wooden fork

Plant matter is lifted and placed on slope

Liquor falls into Pot

Hot aqueous extract is again concentrated

till

Yellowish - green coloured consistency

Then it is transferred to a wooden tub

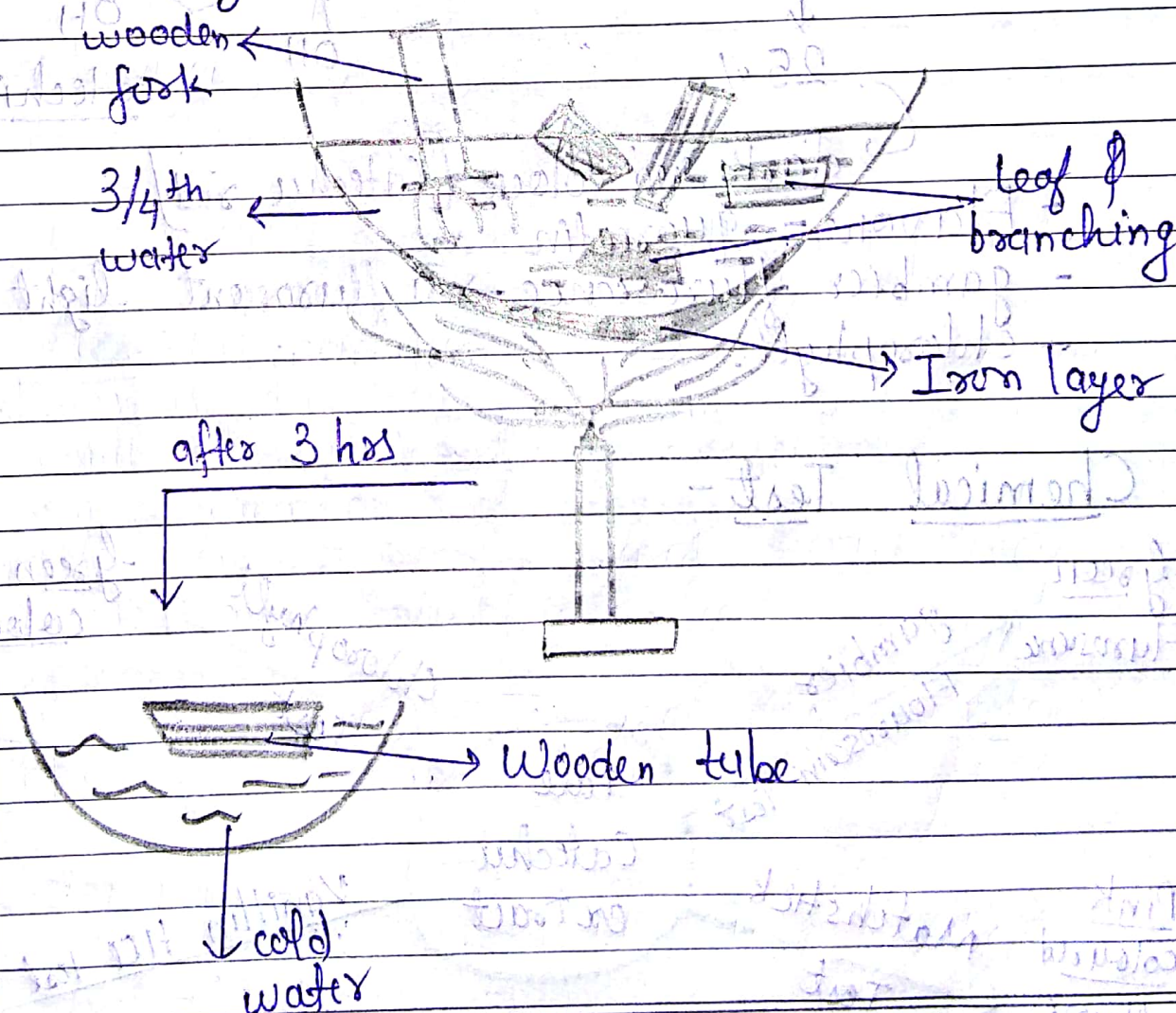
Cooled



So, Crystallization occurs

Cold, semi-crystalline mass is transferred into wooden tray of 2-3 cm depth.

It is allowed to settle and cut into small cubes with the help of wooden knife & dried under sunlight.



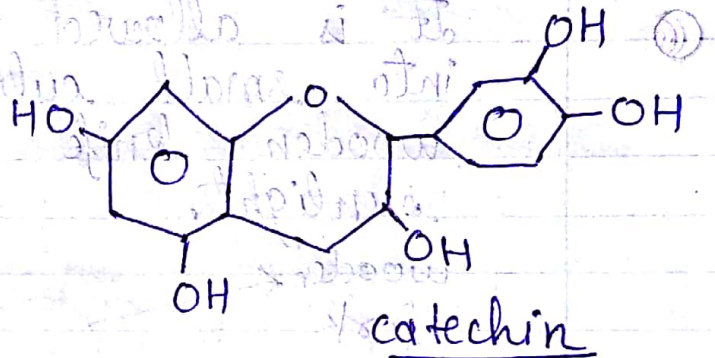
Morphology -

- Cubes $\rightarrow 2.5 \text{ cm}^3$
- Reddish-brown colour
- Odour - odourless
- Taste - Astringent & Slightly bitter
- mounting with lacto-phenol, $\rightarrow$ Needle shaped crystal of catechin.

C.C - 7 - 33% Catechin

- Soluble in hot water & alcohol
- catechutannic acid

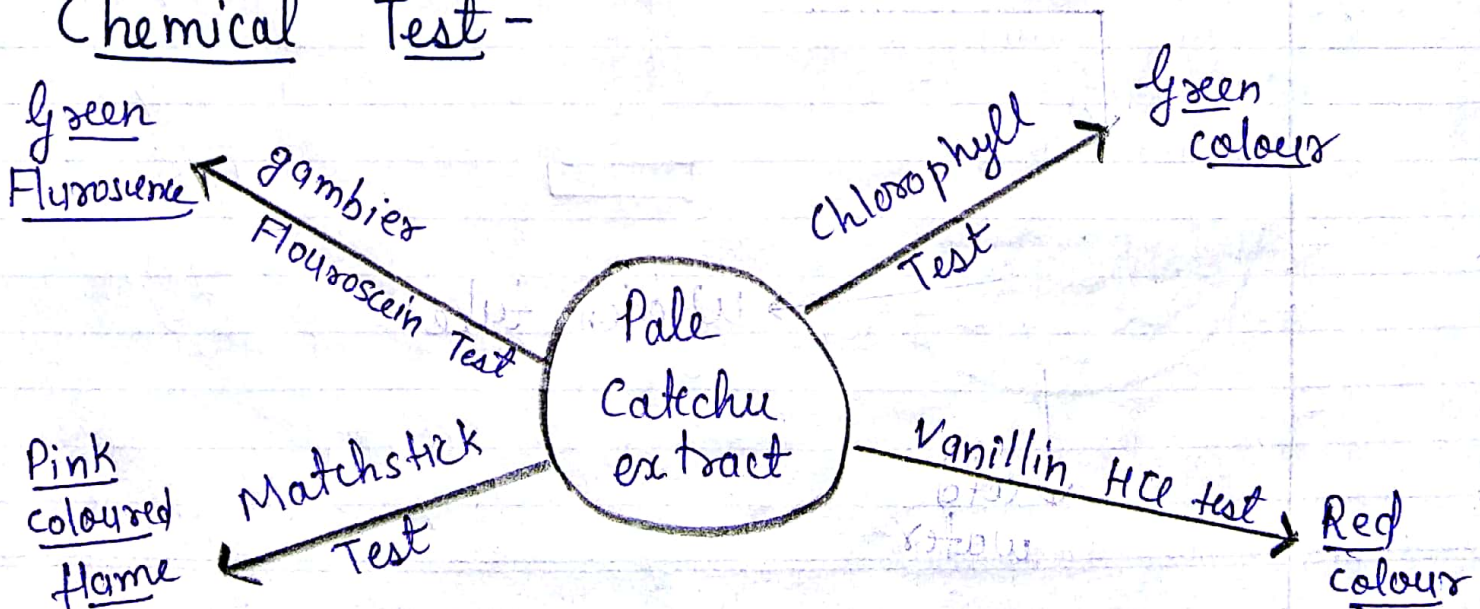
$\downarrow$
25%



$\rightarrow$ dark red colour [Catechu red]

- Flavone - quercetin
- gambier fluorescence $\rightarrow$ a fluorescent light
- Chlorophyll.

Chemical Test -





→ Gambier Fluorescein test

Powder drug
↓

Heat & Filter

↓
Filterate + NaOH

↓
Petroleum ether

↓
Green Fluorescence

[Gambier present]

Uses-

- used as astringent in diarrhoea
- in preparation of lozenges
- widely used in printing & dye industry.
- In native country it is used in preparation of battle leaf.

2) Black Catechu

[Catechu Khadir, Kattha, Catechu nigrum].

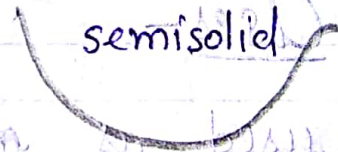
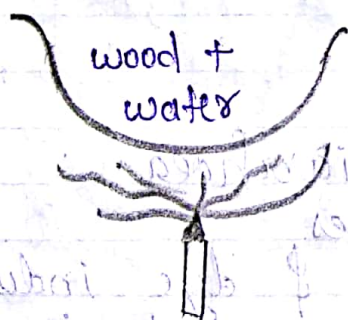
B.S- It is dried extract prepared from heart wood of 'Acacia catechu'

Family - Leguminosae

G.S- Burma, India.

Cultivation & Collection - [Felling's method]

- Preparation of aqueous extract by fallen tree and bark & heart wood.
- Heartwood is cut into small chips & boiled in earthen vessel.



wooden plates

Broken piece
of black &
brown colour

covered with bark



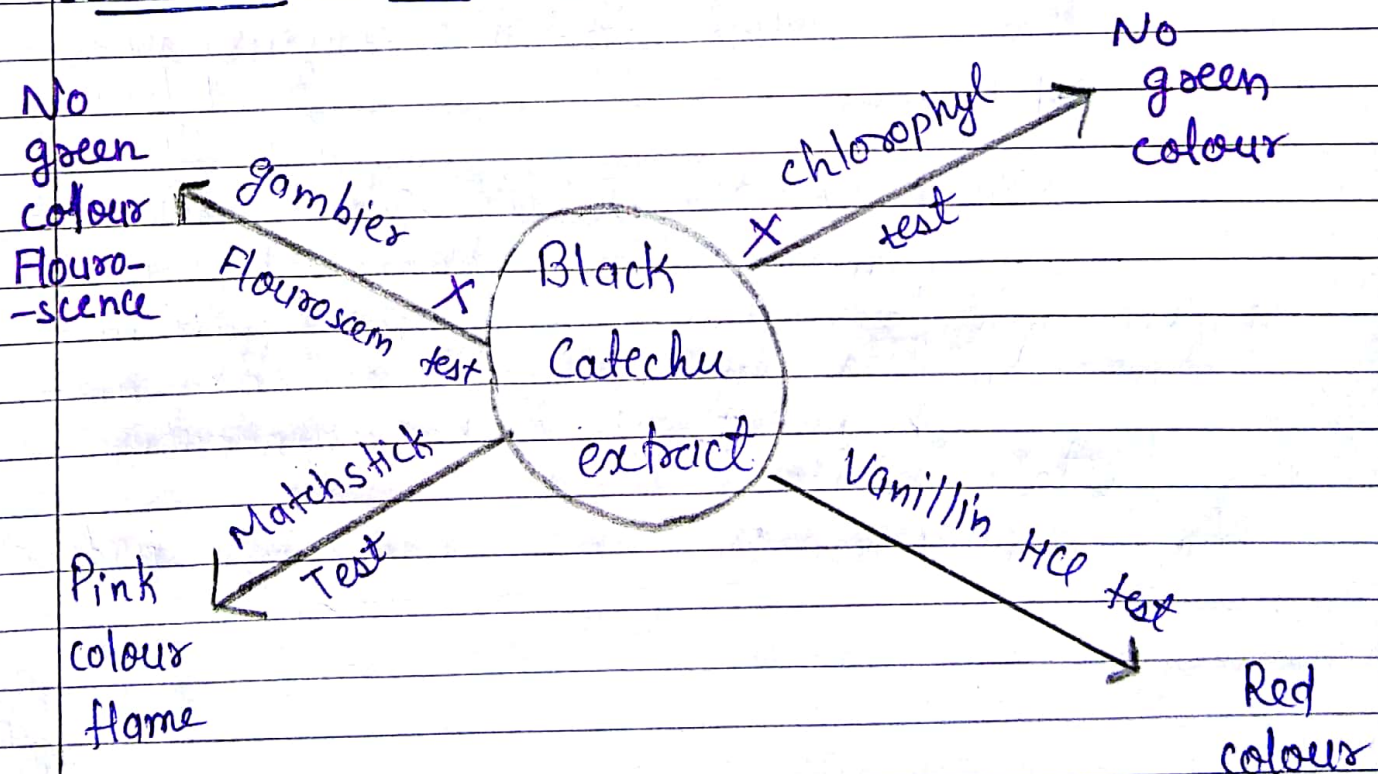
Morphology -

- Irregular shape
- Black colour
- surface shows covering of leaves

C.C - 4-12% Acacatechin [Acacia catechin]

- 25-30% catechutannic acid
- catechu red
- Flavone - quercetin
- gum $\Rightarrow$ 20-30%
- do not contain chlorophyll & gambier

Chemical Test -



Uses -

- used as astringent
- in treatment of diarrhoea
- in tanning process
- in preparation of lozenges
- in printing & dye industry
- used in preparation of betel leaf.



3) Ashoka bark

B.S.- Ashoka bark is a dried stem bark of Saraca indica.

Family - Leguminosae

G.S.- Sri Lanka, Malaysia, Burma & India

Morphology-

- Size = Varying size → 10 cm length
→ 3-6 cm width
→ 5-8 cm thick
- outer surface ⇒ brown in colour
→ longitudinal cracks
- Inner surface ⇒ Reddish brown, smooth

C.C.- Condensed tannins - 6%

- Catechol, sterol
- phlobaphene
- phenolic and non-phenolic glycoside
- Ketosterol and β -sito-sterol
- also contain essential oil
- Calcium and Iron compounds.

Uses -

- used in treatment of gynaecological problems.
- acts as uterine tonic
- have oxytocic activity
- used as sedative
- used as anti-dote

Adulterant -

Polyalthia longifolia [Asopalav]



4) Bael

[Wood apple, bilipatra]

B.S- Bael consists of unripe or half ripe fruits and their slice or irregular pieces; of Aegle marmelos.

Family- Rutaceae.

G.S- India, Burma, Thailand etc...

[used in worshipping of Lord Shiva].

Morphology -

- Size = 5-10 cm in diameter

- shape = spherical

- Type = fleshy; hesperidium

- Epicarp - hard & woody
- orange coloured

- Mesocarp + Endocarp =>

Pulp is reddish brown,
and seeds are embedded in mesocarp.

- seeds are surrounded by mucilage

- Needs 11 months to ripe

- January => Max. constituent

Odour -> Characteristic

Taste -> Astringent & mucilagenous



5-10 cm

C.C → Condensed Tannins

- ↳ Maximum found in January.
- 9% of Tannins
- coumarin glycoside

↳ marmesolin

- marmesin

- psoralean

- marmelide

→ Alkaloid - Aegelin

- Aegelenin

- Marmelin

→ Polysaccharide → Galactose

- Arabinose

- Rhamnose

- Uronic acid

Uses -

- It is a popular drug in ayurveda used for the treatment of diarrhoea & dysentery.
- Alkaloids of fruit have anti-diabetic activity.
- From unripe fruits, Yellow coloured dye is obtained.
- Ripened fruit is used as laxative.
- On steam distillation, Volatile Oil is obtained.
- Root of the Bael is one of the content of Dashmularisth.
- use to prepare sharbat.



5) Pterocarpus

[Vijaysagar, Biyo, Indian Kino]

B.S. - It is dried, heart wood of...
Pterocarpus marsupium.

Family - Leguminosae

G.S. - India, Burma

Morphology -

- Deciduous tree, [30 m height, 2.5 width]
- available into cut chips of various size and shapes.
- very hard and tough.
- Longitudanal ridges found on the surface.
- Colour - dark brown
- Odour - None
- Taste - Astringent

C.C. -
- Pterostilbene
- Carpusin
- Marsupin
- Liquiritiquin
- Isoliquiritiquin
- Marsupol.

Uses-

- anti-diabetic
- hypo-glycemic agent
- cup - made up of heart wood of *Pterocarpus* are used for the treatment of diabetes
- aqueous and alcoholic extract of wood having anti-fungal activity used for preparation of various ointment.
- in treatment of diarrhoea & dysentery.
- used in dye industry.