

الصيدلة	الكلية
العقاقير والنباتات الطبية	القسم
P. Pharmacognosyll	المادة باللغة الانجليزية
مختبر العقاقير II	المادة باللغة العربية
الثالثة	المرحلة الدراسية
م.م سرى باسم غضبان	اسم التدريسي
Tannine	عنوان المحاضرة باللغة الانجليزية
العفصيات	عنوان المحاضرة باللغة العربية
10	رقم المحاضرة
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Practical manual of pharmacognosy lab	

محتوى المحاضرة

Exp.No. 4

[Lab.6]

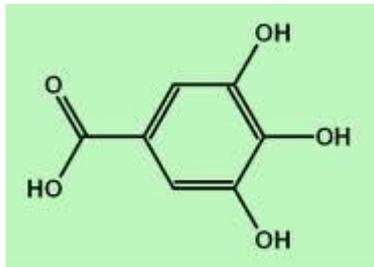
Tannins

Tannins compromise a large group of complex substances that are widely distributed in the plant kingdom. Chemically tannins are complex substances; they usually occur as mixtures of poly hydroxyl phenols that are difficult to separate because they do not crystallize. Tannins are divided according to the identity of the phenolic nuclei involved, and on the way they are joined into two classes:

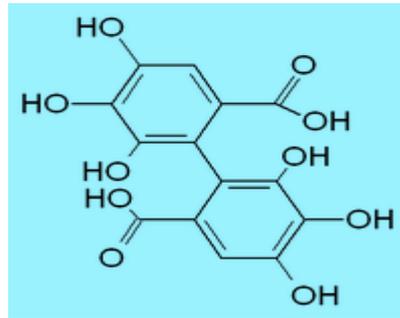
1 .Hydrolysable tannins:

This class consists of **gallic acid** and related polyhydroxy compounds (**hexahydroxydiphenic acid**) and their derivatives esterified with glucose. They

are termed hydrolysable tannins due to ease of esters to hydrolyze to phenolic acids and sugar. They were formerly known as pyrogallol tannins.



Gallic aci

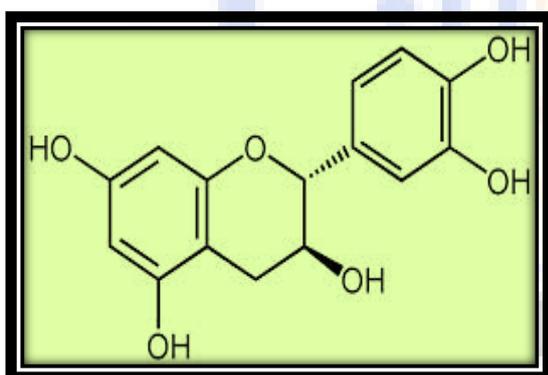


Hexahydroxydiphenic acid

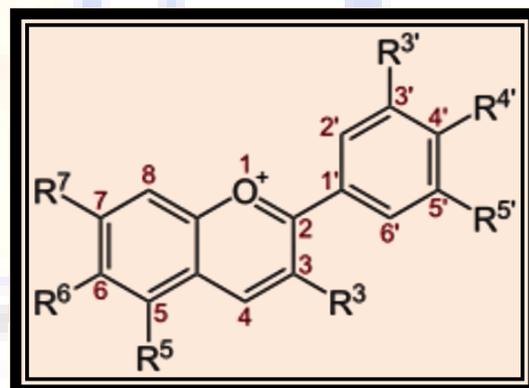
2. *Nonhydrolysable tannins or condensed tannins:*

This class contains only *phenolic nuclei* but frequently linked to carbohydrates or proteins. When treated with hydrolytic agents, these tannins tend to polymerize, yield insoluble usually **red**-colored products known as *phlobaphenes*.

The name (condensed tannins) is due to the fact that on the treatment with hot acid some of C-C bonds are broken yielding *anthocyanidin* monomers. These tannins are sometimes called catechol tannins.



Catechin



Anthocyanins

(Are glucosides of anthocyanidins)

General properties of Tannins:

- ✓ Tannins are non-crystallizable compounds that, with **water** form **colloidal solution** possessing acid reaction and sharp "**puckering**" taste.
- ✓ They cause precipitation of solution of **gelatin** as well as **alkaloids**.
- ✓ They form dark **blue**, **greenish** black soluble compounds with **ferric salts**.
- ✓ They produce deep **red** color with **potassium ferricyanide** and **ammonia**.
- ✓ They are precipitated by salts of **copper**, **lead** and **tin** by strong aqueous **potassium dichromate** or **1% chromic acid** solution. In alkaline solutions; many of their derivatives readily absorb oxygen.
- ✓ Tannins precipitate **proteins** from solution and can combine with proteins, rendering them resistant to proteolytic enzymes. When applied to living tissue this action is known as an "**astringent**" action and forms the basis for therapeutic application of tannins.

Uses of tannins:

1. Astringents, used in the gastrointestinal tract and on the skin abrasion.
2. In the treatment of burns, the proteins of the exposed tissue are precipitated and form a mildly antiseptic protective coat under which the regeneration of new tissue may take place.
3. Use in the process of vegetable-tanning which converts animal hides to leather (leather industry).
4. Antidote treatment of alkaloids poisoning.
5. Ink industry.



Pyrogallotannins(Nut gall)
tannins(*Hamamelis leaf*)

Catechole

Tests on Tannins

I.Catechole tannins:

Plant used: *Hamamelis leaf or witch hazel leaves:*

Is the dried leaf of **Hamamelis** **virginiana** of the family **Hamamelidaceae**.

A. Microscopically Examination:

Examine the powder drug microscopically for the *trichomes* and notice the type of stellate, the form-branched stellate trichomes consisting of 4-12 unicellular branches united by their bases.

B. Chemical Tests:

Aim: Identity test for *Catechol Tannins*.

Procedure:

Boil **5gm** hamamelis leaf, coarsely powdered, with **50 ml** of water. Cool and filter. To **2 ml** portions add the following reagents and notice the results:

1. Few drops solution of **ferric chloride**.
2. **1ml** solution of **lead sub acetate**.
3. **1ml** solution of **potassium dichromate**.
4. **2ml** solution of **gelatin**.

5. **2ml** solution of **quinine dihydrochloride**.(or any alkaloid).
6. **0.5ml** solution of **sodium acid phosphate**, warm, cool and filter. To the filtrate add solution of **phenazone**.
7. **Bromine** solution.
8. **5ml Mitchell's reagent** (**5 ml** of a **0.2% solution of iron** and **ammonium citrate**) and add **1gm sodium acetate**. Boil, cool and filter.

Results:

Notice the colors and precipitates obtained.

II. PyrogallolTannins:

Plant used: *Galls, Nutgall.*

Is the excrescence obtained from the young twigs of **Quercus infectoria** of the family **Fagaceae**.

A. Microscopically Examination:

Examine the powdered drug microscopically and notice the following:

1. Fairly numerous sclerenchymatous cells.
2. Lignin bodies.
3. The presence of only a few small vessels.
4. A few starch grains.
5. Tannin flakes, visible in clove oil mount.
6. Thick -walled, pitted parenchyma with both cluster and prismatic crystals of calcium oxalate.
7. Occasional insect fragments.

B. Chemical Tests:

Aim: Identity test for **Pyrogallol Tannins**.

Procedure:

Prepare **0.1%** suspension of powdered nutgall in water and is treated with:

1. A saturated solution of **potassium dichromate** plus a trace of **acetic acid**.
2. A **1%** solution of **sodium carbonate**.
3. A **5% ferric sulphate** solution.
4. A **1% ferric acetate** solution.
5. Shake **0.1gm** powdered nutgall with **1ml** of water, micro filter one drop into an evaporating dish. Add one drop of a **5% ferric chloride** solution.
6. Repeat the test no.5 with **bromine** water.

Results:

Notice the colors and precipitates obtained.

Study problems:

Q1. How many kinds of Tannins according to the phenolic nuclei? Explain with structures?

Q2. How can you identify an extract containing Pyrogallol tannins?

Q3. How can you identify an extract containing Catechol tannins?

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