**SHAMBHUNATH INSTITUTE OF PHARMACY**

IST  Sessional Examination 2019-2020

B.Pharm 3rd year and 5th Sem.

Subject –PHARMACOGNOSY AND PHYTOCHEMISTRY II

**Time: - 1.30 hrs**. **Max. Marks: –3 0**

**Paper Code:** BP504 T.

**Roll No**

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SECTION-A

1. **Attempt all the questions: (10X1=10)**
2. **What is Gold beaters skin test?**

**Answer:** A small piece of goldbeater skin is soaked in 20% hydrochloric acid and placed in a solution of tannin for 5 minutes. The skin piece is washed with distilled water and kept in a solution of ferrous sulphate. A brown or black colour is produced on the skin due presence of tannins.

1. **Chief constituent of Gentian is** \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Answer:** Gentiopicrin or gentiopicroside

1. **Give the biological source of Opium.**

**Answer: Opium** is dried [latex](https://en.wikipedia.org/wiki/Latex) obtained from the seed capsules of the opium poppy *[Papaver somniferum](https://en.wikipedia.org/wiki/Papaver_somniferum%22%20%5Co%20%22Papaver%20somniferum)*, belonging to family Papaveraceae.

1. **Give an identification test for Digitalis.**

**Answer:** **Killer killiani test:** Digitalis is dissolved in a mixture of 1 % ferric sulphate solution in (5%) glacial acetic acid. Add one or two drop of concentrated sulphuric acid. A blue colour develops due to the presence of deoxy sugar.

1. **Define Lignans.**

**Answer :** Lignans are polyphenols found in plants. Lignan precursors are found in a wide variety of plant-based foods, including seeds, whole grains, legumes, fruit, and vegetables. Flaxseeds are the richest dietary source of lignan precursors.

1. **Name different types of tracer techniques.**

**Answer:** Tracer techniques are:

* use of isolated organ
* grafting methods
* use of mutant strain
1. **What is the biological source and use of Artemesia.**

**Answer :** It consist of Chinese traditional herb Artemisia annua belonging to family Asteraceae.Artemisinin present in Artemisia is used as antimalarial.

1. **Give an example of Volatile oil with its Biological source.**

**Answer:** Fennel obtained from dried ripe fruit of Foeniculum vulgare belonging to family Umbelliferae.

1. **Define Carotenoids.**

**Answer:** Carotenoids are C40 compounds of terpenoid group. Carotenoids serve two key roles in plants and algae: they absorb light energy for use in photosynthesis, and they protect chlorophyll from photodamage.

1. **Name one drug of resin with its biological source.**

**Answer:** Ginger obtained from dried rhizomes of Zingiber officinale belonging to family Zingiberaceaea.

 SECTION-B

1. **Attempt any two of the following: (2X5=10)**
2. **What is Glycoside? Classify the Glycosides with suitable examples.**

**Answer:** G**lycoside** is a [molecule](https://en.wikipedia.org/wiki/Molecule) in which a [sugar](https://en.wikipedia.org/wiki/Sugar) is bound to another [functional group](https://en.wikipedia.org/wiki/Functional_group) via a [glycosidic bond](https://en.wikipedia.org/wiki/Glycosidic_bond%22%20%5Co%20%22Glycosidic%20bond). These glycoside can be activated by [enzyme](https://en.wikipedia.org/wiki/Enzymatic) [hydrolysis](https://en.wikipedia.org/wiki/Hydrolysis),[ which causes the sugar and aglycone part to be broken off and making aglycone part available for its therapeutic effect . On the basis of aglycone moiety glycosides are classified as:

1. Anthraquinones glycosides - Aloe, Senna
2. Cardiac glycosides - Digitalis , Squill
3. Saponin glycosides – Ginseng , Dioscorea
4. Coumarin glycoside – Ammi, Psoralea
5. Cynophore glycoside –Bitter almond, wild cherry
6. Flavanoids glycosides – Parsley , Rutin
7. Isothiocyanate glycosides – Black mustard
8. Phenol glycosides – Bearberry
9. Aldehyde glycosides – Vanilla pods
10. Bitter glycoside – Gentian, Chirata
11. Steroidal glycol alkaloids - Solanum
12. **Differentiate between Siam benzoin and Sumatra benzoin.**

**Answer:** Siam benzoin and Sumatra benzoin can be differentiated by the following

|  |  |  |
| --- | --- | --- |
| **Basis** | **Sumatra** | **Siam** |
| Biological Source | Obtained from Styrax benzoin belonging to family Styraceae | Obtained from Styrax tonkinensis belonging to family Styraceae |
| Geographical Source | South eastern asia, chiefly Sumatra | Thailand, Sumatra |
| Physical properties* Colour
* Odour
* Taste
* Shape
 | * Greyish brown or grey
* Aromatic
* Sweetish, slightly acrid
* Lump of varying size
 | * Yellowish brown
* Aromatic
* Sweetish,slightly acrid
* Hard & brittle mass
 |
| Chemical constituent | Benzoic acid, Benzoresinol, Siaresinotannol and Vanillin | Benzoic acid, cinnamic acid , summaresinotannol, styrol |
| Chemical test* 2.5g benzoin added to 10 ml ether and sulphuric acid
* 4 ml solution of potassium permagnate add 1 g of benzoin and warm the mixture
 | * Deep brown colour observed.
* Odour of benzaldehyde is produced.
 | * Deep purplish red colour.
* No reaction
 |

1. **Give brief introduction of tracer technique and its application.**

**Answer :** It can be defined as technique which utilizes a labelled compound to find out or to trace the different intermediates and various steps in biosynthetic pathways in plants, at a given rate & time. In this technique different isotope, mainly the radioactive isotopes which are incorporated into presumed precursor of plant metabolites and are used as marker in biogenic experiments.

*SIGNIFICANCE OF TRACER TECHNIQUE*

* Tracing of Biosynthetic Pathway: - e.g. By incorporation of radioactive isotope of 14C into phenylalanine, the biosynthetic cyanogenetic glycoside prunasin, can be detected.
* Location & Quantity of compound containing tracer: - 14C labelled glucose is used for determination of glucose in biological system
* Different tracers for different studies: - For studies on nitrogen and amino acid. (Labelled nitrogen give specific information than carbon)
* Convenient and suitable technique.

SECTION-A

1. **Attempt any one of the following : (1X10=10)**

1. Write down the complete pharmacognosy of Aloe.

Answer : Aloe is an anthraquinone glycoside class of drug. Pharmacognostic study of Aloe.

Synonyms: Aloe, Ghritkumari

Biological Source: Aloe is the dried juice collected by incision from the bases of the leaves of various species of aloe viz., Aloe barbadensis(Curacao aloes), Aloe perryi (Scotrine aloes and Zanzibar aloes), Aloe ferox (Cape aloe). Belonging to family Liliaceae

 **Geographical source:**Aloe perryi: Baker is found in Socotra and Zanzibar Islands. Aloe vera Linn is native of north Africa.

#### Morphology:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Description**  | **Curacao** | **Cape** | **Scotrine** | **Zanzibar** |
| Colour | Yellow brown to chocolate brown | Greenish brown | Yellow brown to dark brown | Brown |
| Odour  | Strong odour | Sour odour | Unpleasant | Considered pleasant |
| Taste  | Bitter  | Unpleasant  | Bitter | Bitter  |

#### Chemical Constituents:

Aloe may contain upto 30% aloin which is a mixture of three isomers: barbaloin, β-barbaioin and isobarbaloin. Barbaloin present in all the four varieties is slightly yellow-coloured, bitter, water-soluble, crystalline glycoside.

β-barbaloin is amorphous and present in Cape aloe and can be produced from barbaloin on heating. Isobarbaloin is crystalline, present in Curacao aloe and in traces in Cape aloe and absent in Socotrine and Zanzibar aloe and is probably a mixture of barbaloin and polyphenols responsible for its colour tests. Barbaloin is a C-glycoside compared to common O-glycosides.

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#### Chemical Tests:

For carrying out the tests a clear solution of aloe is prepared as follows: Boil 1 gm with 100ml of water, allow it to cool; add 1 gm kieseliguhr, stir, it well and filter through filter paper.

**1. Borax test:**

Take 10 ml of solution and add 5 gm of borax and heat. Green colour fluorescence is seen which is due to aloe-emodin anthranol. This test becomes more sensitive, if 5 to 10 drops of this reaction mixture are taken a test tube and tilled with water.

**2. Bromine Test:**

Add equal volume of bromine solution to solution of aloe. Bulky yellow precipitate of tetrabromaloin is formed.

**3. Modified Anthraquinones Test:**

Take 0.1 gm of drug and add 5ml of 5% solution of ferric chloride and 5ml dilute hydrochloric acid and heat on boiling water-bath for 5 minutes, cool the solution and shake gently with a organic solvent like benzene. Separate the organic solvent layer and add an equal volume of dilute ammonia. A pinkish red colour is formed in ammonical layer. This test is of C. glycoside.

**4. Cupraloin Test:**

Dilute 10 ml of the solution of aloe to 10 ml with water and add to it 1 drop of copper sulphate solution. Bright yellow colour is produced. Add 10 drops of saturated solution of sodium chloride. Colour change to purplish. Add 20 drops of 90% alcohol, the purplish colour persist.

**5. Nitrous acid test:**

Add few small crystals of sodium nitrite and few drop of dilute acetic acid to 5 ml of solution of aloe. Pink of purplish colour is produced.

**6. Nitric acid Test:**

**Different aloe show different colours with nitric acid:**

(a) Curacao aloe deep reddish -brown

(b) Socotrine aloe – Pale yellow brown

(c) Zanzibar aloe- Yellow -brown

(d) Cape aloe- First brown, changing to green later

Nitric acid test can be performed by taking little Coarse drug on while porcelain tile and adding nitric acid to it

#### Uses:

1. Aloe and aloin are strong purgative and in higher doses may act as abortifacient.

2. It used alone, aloe causes griping and is usually combined with carminatives or antispasmodic like belladonna or hyocyamus.

3. Ointment of aloe gel is used in sunburns, thermal burns, radiation burns, and abrasion and skin irritation and prevents ulceration and malignancy.

1. Discuss Shikimic acid pathway in details.

**Answer:** The shikimate pathway is a seven step metabolic route used by *bacteria, fungi,*

*algae, parasites, and plants* for the biosynthesis of aromatic amino acids

(*phenylalanine, tyrosine, and tryptophan*).

* This pathway is not found in animals; therefore, phenylalanine and tryptophan

represent *essential amino acids* that must be obtained from the animal's diet

* Animals can synthesize tyrosine from phenylalanine, and therefore is not an essential amino acid except for *individuals unable to hydroxylate phenylalanine to tyrosine)*



* *Phosphoenolpyruvate* and *erythrose-4-phosphate* react to form *2-keto3-*

*deoxy7phosphoglucoheptonic acid*, in a reaction catalyzed by the enzyme **DAHP**

**synthase.**

* *2-keto3-deoxy7phosphoglucoheptonic acid* is then transformed to *3-dehydroquinate*

*(DHQ)*, in a reaction catalyzed by **DHQ synthase**.

* Although this reaction requires nicotinamide adenine dinucleotide (NAD) as a cofactor,

the enzymic mechanism regenerates it, resulting in the net use of no NAD.

* DHQ is dehydrated to *3-dehydroshikimic acid* by the enzyme *3-dehydroquinate*

*dehydratase*, which is reduced to *shikimic acid* by the enzyme *shikimate*

*dehydrogenase*, which uses nicotinamide adenine dinucleotide phosphate

(NADPH) as a cofactor.

* The next enzyme involved is *shikimate kinase*, an enzyme that catalyzes the ATPdependent phosphorylation of shikimate to form *shikimate 3-phosphate*. Shikimate

3-phosphate is then coupled with *phosphoenol pyruvate* to give *5- enolpyruvylshikimate-3-phosphate* via the enzyme *5-enolpyruvylshikimate-3- phosphate* ***(EPSP) synthase****.*

* Then 5-enolpyruvylshikimate-3-phosphate is transformed into chorismate by a

***chorismate synthase.***

* *Prephenic acid* is then synthesized by a *Claisen rearrangement* of chorismate by

***Chorismate mutase****.*

* *Prephenate* is *oxidatively decarboxylated* with retention of the hydroxyl group by **Prephenate dehydrogenase** to give *phydroxyphenylpyruvate,* which is transaminated using glutamate as the nitrogen source to give *tyrosine and α-ketoglutarate.*

**Role of Shikimic Acid Pathway:**

* Starting Point in The Biosynthesis of Some Phenolics

 *Phenyl alanine and tyrosine are the precursors* used in the biosynthesis of phenylpropanoids. The phenylpropanoids are then used to produce the *flavonoids, coumarins, tannins and lignin.*

* Gallic acid biosynthesis Gallic acid is formed from *3-dehydroshikimate* by the action of the *enzyme shikimate dehydrogenase* to produce *3,5-didehydroshikimate*. The latter

compound spontaneously rearranges to gallic acid.

Shikimic acid is a precursor for:

* indole, indole derivatives and aromatic amino acid tryptophan and tryptophan

derivatives such as the psychedelic compound dimethyltryptamine.

* Many alkaloids and other aromatic metabolites.