

PHARMACOGNOSY-II

UNIT 4 NOTES

- **Industrial Production**
- **Farskolin**
- **Sennoside**
- **Artemisinin**
- **Diosgenin**
- **Digoxin**
- **Atropine**
- **Podophyllotoxin**
- **Caffeine**
- **Taxol**
- **Vincristine**
- **Vinblastine**



NOTES AVAILABLE AT :



WWW.IMPERFECTPHARMACY.IN

FORSKOLIN

- Forskolin is a natural compound derived from the root of *Coleus forskohlii* and belongs to family Lamiaceae.

Industrial Production

- The roots of *Coleus forskohlii* are harvested, cleaned and dried to reduce moisture content, preserving forskolin content.
- The dried roots are crushed into powder.
- Solvent extraction is performed using organic solvents like ethanol or methanol to extract forskolin.
- The crude extract undergoes purification using techniques like :
 - Liquid- Liquid extraction or
 - Chromatography.
- Purified forskolin is processed into desired forms for pharmaceutical or supplement use.

ESTIMATION OF FORSKOLIN

Forskolin can be estimated using Thin Layer Chromatography :

- Sample Preparation : 1mg of Forskolin is dissolved in 1ml of Methanol.
- Standard Sample : Pure Forskolin
- Stationary Phase: Silica gel-G
- Mobile : Phase: Chloroform : Methanol (9:1)
- Detecting Agent: Vanillin - Sulfuric Acid Reagent
- Rf Value : 0.30 - 0.50

UTILIZATION OF FORSKOLIN

- Antidepressant
- Vasodilator
- In Glaucoma
- In Asthma
- In Obesity

SENNOSIDE

Sennoside is a naturally occurring compound found in the leaves and pods of Senna plant, specifically Senna Alexandrina (Cassia Acutifolia) or Indian Senna (Cassia Augustifolia) belonging to family Leguminosae.

INDUSTRIAL PRODUCTION OF SENNOSIDE

- Senna plants (Cassia augustifolia or Cassia acutifolia) are cultivated, harvested and dried.
- The dried leaves or pods are subjected to solvent extraction to isolate bioactive sennosides.
- The crude extract is purified using techniques like filtration, crystallization or chromatography to remove impurities and concentrate the sennosides.
- Obtained sennosides are processed into dosage forms like tablets, capsules or syrups for pharmaceutical use.

ESTIMATION OF SENNOSIDE

Sennoside can be estimated using Thin Layer Chromatography.

- Sample Preparation: 1 mg of sennoside is dissolved in 1 ml of methanol.
- Standard Sample: Pure Sennoside
- Stationary Phase: Silica gel - G
- Mobile Phase: Chloroform: Methanol: Water (70:30:5)
- Detecting Agent: UV light
- R_F Value: 0.4-0.6

UTILIZATION OF SENNOSIDE

- Treatment of Constipation
- In skin diseases
- Useful in loss of appetite, indigestion, jaundice and anaemia

ARTEMISININ

Artemisinin is a potent Antimalarial drug derived from the herb *Artemisia annua* (sweet wormwood) & belongs to family *Astraceae*.

INDUSTRIAL PRODUCTION OF ARTEMISININ

It involves following steps

- The leaves of *artemisia annua* are harvested and dried immediately at the peak of artemisinin content, often during flowering stage.
- A suitable solvent such as Ethanol or methanol is used to extract artemisin from dried leaves
- Extraction is performed using Soxhlet Extraction or Supercritical Fluid Extraction.
- After the crude extract is obtained, purification methods such as Column Chromatography or recrystallization are employed to isolate pure Artemisinin.

ESTIMATION OF ARTEMISININ

- Sample Preparation : 1 mg of Artemisinin dissolved in Methanol
- Standard Sample : Pure Artemisinin
- Stationary Phase : Silica gel G
- Mobile Phase : Hexane : Ethyl Acetate (70:30)
- Detecting Agent : p- Anisaldehyde spray agent
- Rf Value : 0.3-0.4

UTILIZATION OF ARTEMISININ

- Treatment of Malaria
- Anticancers
- Immune Disorders
- Inflammatory Diseases

DIOSGENIN

Diosgenin is a naturally occurring compound found in various plants, particularly in the roots of Dioscorea species and belongs to family Dioscoreaceae.

INDUSTRIAL PRODUCTION OF DIOSGENIN

It involves following steps:

- Tubers or seeds of diosgenin are harvested, cleaned and dried to reduce moisture.
- The plant material is powdered and treated with acid or alkaline hydrolysis to release diosgenin
- Crude diosgenin is purified using crystallization or solvent extraction to obtain a high purity product.

ESTIMATION OF DIOSGENIN

- Sample Preparation : 1 mg of Diosgenin is dissolved in 50 ml of chloroform
- Standard Sample : Pure Diosgenin
- Stationary Phase : Silica gel G
- Mobile Phase : n- heptane : Ethyl acetate
- Detecting Agent : 10% sulfuric acid in ethanol
- Rf Value : 0.47

UTILIZATION OF DIOSGENIN

- As a precursor for steroidal synthesis
- In preparation of oral contraceptives
- Anti inflammatory & Anti diabetic agent
- Cholesterol regulation

DIGOXIN

Digoxin is a naturally occurring cardiac glycoside obtained from leaves of *Digitalis lanata* or *Digitalis purpurea* belonging to family Scrophulariaceae.

INDUSTRIAL PRODUCTION OF DIGOXIN

It involves following steps :

- the leaves of *Digitalis purpurea* or other *Digitalis* species, which contain the highest concentration of glycosides are harvested
- The leaves are then dried and after that subjected to solvent extraction. this process extract the mixture of cardiac glycosides, including digoxin, from the plant material.
- After that crude extract undergoes purification to isolate digoxin using methods such as liquid-liquid extraction or chromatography.
- After purification, digoxin is formulated into oral tablets, injectables or other suitable dosage forms.

ESTIMATION OF DIGOXIN

Digoxin can be estimated using Thin Layer Chromatography.

- Sample Preparation : 250 mg of sample dissolved in 25 ml 50% methanol
- Mobile Phase : Ethyl Acetate : Methanol : Water
- Stationary Phase : Silica gel G
- Standard Sample : Pure Digoxin
- Detecting Agent : UV light
- R_f Value : 0.5-0.7

UTILIZATION OF DIGOXIN

- Congestive Heart failure
- Reduce the risk of blood clotting

ATROPINE

Atropine is a tropane alkaloid obtained from fresh or dried leaves and flowering tops of *Atropa Belladonna* and belongs to family Solanaceae.

INDUSTRIAL PRODUCTION OF ATROPINE

- Harvest the leaves or roots of plant *Atropa Belladonna*, as they contain the highest concentration of Atropine.
- Now extract the dry powder with dilute acid (like HCl) to form water soluble Atropine Salts.
- Add an Alkaline Solution (eg. ammonia) to convert Atropine to its free base.
- Extract the free base using an organic solvents like ether or chloroform.
- Evaporate the solvent and recrystallize Atropine for purity.

ESTIMATION OF ATROPINE

Atropine can be estimated using Thin Layer Chromatography

- Sample Preparation : 1 mg of Atropine is dissolved in 1 ml of chloroform
- Standard Sample : Pure Atropine
- Stationary Phase : Pre-coated silica gel
- Mobile Phase : Toluene : Ethyl Acetate : Diethyl Amine (70:20:10)
- Detecting Agent : Dragendorff's Reagent
- Rf Value : 0.70

UTILIZATION OF ATROPINE

- Anticholinergic Agent
- Antisecretory
- Antispasmodic
- Antiarrhythmic

PODOPHYLLOTOXIN

Podophyllotoxin is a naturally occurring product obtained from roots and rhizomes of *Podophyllum hexandrum* & *Podophyllum Emodi* belonging to family Berberidaceae.

INDUSTRIAL PRODUCTION OF PODOPHYLLOTOXIN

- Collect and dry the roots or rhizomes of *Podophyllum* species, then grind them into a fine powder.
- Extract the powder using solvents like ethanol or methanol through process like maceration or Soxhlet extraction.
- Filter the extract to remove solid waste.
- Concentrate the extract by evaporating the solvent under reduced pressure.
- Purify the crude extract through chromatographic techniques such as Column Chromatography, which separates podophyllotoxin from other compounds.

ESTIMATION OF PODOPHYLLOTOXIN

Podophyllotoxin can be estimated using Thin Layer Chromatography.

- Sample Preparation : 1 mg of Podophyllotoxin is dissolved in 1 ml methanol
- Standard Sample : Pure Podophyllotoxin
- Stationary Phase : Silica gel G
- Mobile Phase : Chloroform : Methanol (90:10)
- Detecting Agent : Vanillin - Sulphuric Acid
- R_f Value : 0.65

UTILIZATION OF PODOPHYLLOTOXIN

- Antiviral Agent
- Antitumor Agent
- Purgative
- Emetics

CAFFEINE

Caffeine is a natural stimulant obtained from leaves and leaf buds of *Thea sinensis* belonging to Theaceae family and from dried ripe seeds of *Coffea arabica* belonging to Rubiaceae family.

INDUSTRIAL PRODUCTION OF CAFFEINE

- Harvest and dry the plant material (e.g. coffee beans or tea leaves).
- Use a solvent like hot water, ethanol or chloroform to extract caffeine from plant material through maceration or Soxhlet extraction.
- Filter the solution to remove solid plant waste.
- Evaporate the solvent to concentrate the caffeine extract.
- Purify the caffeine using techniques like recrystallization or column chromatography.

ESTIMATION OF CAFFEINE

Caffeine can be estimated using Thin Layer Chromatography:

- Sample Preparation: 1 mg of caffeine is dissolved in 1 ml methanol.
- Standard Sample: Pure Caffeine
- Stationary Phase: Silica gel G
- Mobile Phase: Ethyl Acetate : Methanol : Acetic Acid (80:10:10)
- Detecting Agent: Expose to vapours of Iodine
- Rf Value: 0.41

UTILIZATION OF CAFFEINE

- Pain Relief
- Stimulants
- Respiratory Disorders
- Neurological Disorders

TAXOL

Taxol is derived from the bark of *Taxus brevifolia* belonging to family Taxaceae.

INDUSTRIAL PRODUCTION OF TAXOL

- Bark, leaves or needles of *Taxus brevifolia* or related species are collected.
- The dried powdered material is subjected to solvent extraction using organic solvents like methanol, ethanol or mixture of chloroform and methanol.
- The crude extract is purified using methods like :
 - Column Chromatography
 - High Performance Liquid Chromatography

ESTIMATION OF TAXOL

Taxol can be estimated using Thin Layer Chromatography :

- Sample Preparation : 1 mg of Taxol is dissolved in 1 ml of Chloroform.
- Standard Sample : Pure Taxol
- Stationary Phase : Silica gel - G₁
- Mobile Phase : Chloroform : Methanol (9:1)
- Detecting Agent : 10% sulfuric acid in ethanol
- R_f Value : 0.55-0.65

UTILIZATION OF TAXOL

- Breast Cancer
- Ovarian Cancer
- Lung Cancers
- Bladder Cancers

VINCRIStINE & VINBLASTINE

Vincristine & Vinblastine are isolated from the dried whole plant of *Catharanthus roseus* or *Vinca rosea* belonging to family Apocynaceae.

INDUSTRIAL PRODUCTION OF VINCRIStINE & VINBLASTINE

- The leaves of *Catharanthus roseus* are harvested, dried and subjected to solvent extraction using organic solvents like Methanol or ethanol.
- The crude extract undergoes purification through techniques like liquid-liquid extraction and chromatography to isolate Vincristine and Vinblastine.
- Minor chemical modifications are made to convert one compound to another (e.g., Vincristine from Vinblastine) if required.
- Purified alkaloids are formulated into injectable forms for clinical use.

ESTIMATION OF VINCRIStINE & VINBLASTINE

It ~~may~~ can be estimated using Thin Layer Chromatography

- Sample Preparation: Dissolve vincristine or vinblastine extract in suitable solvent.
- Standard Sample: Pure Vincristine & Vinblastine
- Stationary Phase: Silica gel G₁
- Mobile Phase: Chloroform: Methanol: Ammonia (80:20:1)
- Detecting Agent: Dragendorff's Reagent
- R_f Value: Vincristine : 0.35-0.45
Vinblastine : 0.25-0.35

UTILISATION OF VINCRIStINE & VINBLASTINE

- Acute Lymphoblastic Leukemia
- Lymphomas
- Hodgkin's Lymphoma
- Non-Hodgkin's Lymphoma
- Testicular Cancers
- Breast Cancers

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