

Glycoside

1. The most suitable test for digitoxose is: [GPAT 2024]

- (a) Dragendrof's test (b) Hager's test (c) Baljet test (d) Keller-Kiliani

2. ed borntrager's test is used to detect the presence of which type of glycosides [GPAT-2023 SHIFT-II]

- (a) O-type of glycosides (b) C-type of glycosides
(c) S-type of glycosides (d) N-type of glycosides

3. Aloe contains ____ type of glycosides [GPAT-2023 SHIFT-II]

- (a) C-glycosides (b) O-glycosides (c) S-glycosides (d) N-glycosides

4. Methanolic extract of a crude drug powder when treated with magnesium turnings and concentrated hydrochloric acid turned the solution magenta coloured. The test is termed as [GPAT-2017]

- (a) Shinoda test (b) Van Urk's Test (c) Keller Kiliani test (d) Vitali Morin Test

5. A crude drug powder was heated with ferric chloride, water and concentrated hydrochloric acid followed by extraction with chloroform. The chloroform layer was treated with ammonia, the ammoniacal layer turned pink. The test indicates presence of phytoconstituent [GPAT-2017]

- (a) Anthraquinone-C-glycosides (b) Flavanones
(c) Cardiac glycosides (d) Saponin glycosides

6. An example of N-glycoside is [GATE-2010]

- (a) Adenosine (b) Sinigrin (c) Rhein-8-glucoside (d) Aloin

7. Klunge's test is for the identification of [GATE-2009]

- (a) Barbaloin (b) Isobarbaloin
(c) Aloinosides (d) Aloesin

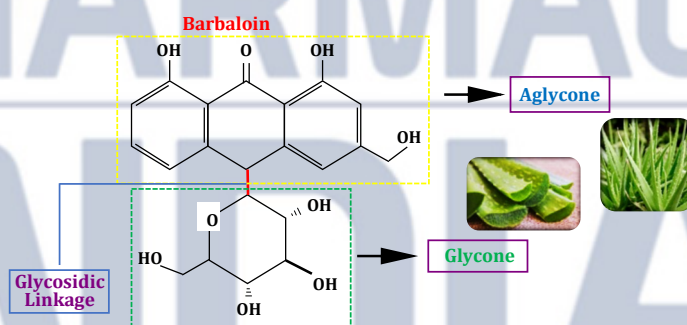
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INTRODUCTION

- **Glycosides** are complex organic compounds, primarily from plant sources, which on enzymatic or acid hydrolysis yield one or more sugar moieties (**glycone**) and a non-sugar moiety (**aglycone** or **genin**).
- Chemically, they are acetals or sugar ethers.
- The linkage between the glycone and aglycone is termed a **glycosidic bond**. While plants contain only **β -D-glycosides**, both α and β stereoisomers can be synthesized.



- Glycosides are generally crystalline or amorphous substances, soluble in water and dilute alcohol, but insoluble in non-polar organic solvents like chloroform or ether. They are optically active, typically exhibiting **laevo-rotatory** effects



CLASSIFICATION OF GLYCOSIDES

Classification Based on Glycosidic Linkage

| Type of Linkage | Description | Examples |
|---------------------|---|---|
| O-glycosides | The sugar moiety is linked to the aglycone through an oxygen atom (-O-), typically from a hydroxyl (alcoholic or phenolic) group. | Sennosides from Senna, Barbaloin , most cardiac glycosides. |
| C-glycosides | The sugar moiety is directly attached to a carbon atom of the aglycone. These are resistant to acid hydrolysis. | Aloin and Cascarosides from Aloe and Cascara. . |
| S-glycosides | The sugar moiety is linked to a sulfur atom (-S-) of the aglycone. | Sinigrin from Black mustard. |
| N-glycosides | The sugar moiety is linked to a nitrogen atom (-N-) of an amino group in the aglycone. | Nucleosides (e.g., Adenosine). |

Classification Based on Aglycone

| Class of Glycoside | Aglycone Nature | Examples | Trick |
|--|--|--|---|
| Anthraquinone Glycosides | Anthracene derivatives | Senna, Aloe, Rhubarb, Cascara | "SAR Cast" - SAR = Senna, Aloe, Rhubarb, Cast = Cascara |
| Steroidal or Cardiac Glycosides | Steroidal nucleus (cyclopentanoperhydrophenanthrene) | Digitalis, Strophanthus, Squill, Thevetia | "Digi-Strong Squill TV" - Digitalis, Strophanthus, Thevetia |
| Saponin Glycosides | Triterpenoid or Steroidal | Liquorice, Ginseng, Dioscorea, Shatavari, Senega | "L-G DSS" - Liquorice, Ginseng, Dioscorea, Shatavari, Senega |

| | | | |
|---|--|---------------------------------------|---|
| Cyanogenetic Glycosides | Mandelonitrile derivatives | Bitter almond, Wild cherry bark | " Bitter Wild Cherry " = direct association |
| Isothiocyanate Glycosides | Isothiocyanate derivatives | Black mustard | " ISO = Mustard's kick " - Isothiocyanate → pungent mustard |
| Flavonoid Glycosides | Flavone derivatives | Rutin, Ginkgo, Milk thistle | " Routine GM " - Rutin, Ginkgo, Milk thistle |
| Coumarin & Furanocoumarin Glycosides | Coumarin or Furanocoumarin derivatives | Ammi, Psoralea, Visnaga | " Ammi's Positive Vision " - Ammi, Psoralea, Visnaga |
| Aldehyde Glycosides | Aldehyde-containing aglycone | Vanilla | " Vanilla = Aldehyde Aroma " - strong aldehyde scent |
| Phenol Glycosides | Simple phenolic aglycone | Bearberry | " Phenol Bear " - Bear loves berries |
| Steroidal Glyco-alkaloids | Steroidal alkaloid | Solanum | " Steroid + Solanum = SOLID " - strong alkaloid logic |
| Glycosidal Bitters | Various bitter principles | Gentian, Picrorhiza, Chirata, Quassia | " Gentle Picked Chilly Quassia " = Gentian, Picrorhiza, Chirata, Quassia |

CHEMICAL TESTS FOR GLYCOSIDES (Refer to Chapter 4 for Detailed Information)

| Test Name | Specific For | Procedure & Reagents | Observation |
|-----------------------------------|--|--|--|
| Borntrager's Test | Anthraquinone Glycosides | Drug powder + dilute H ₂ SO ₄ → Boil & Filter → Add organic solvent (benzene/ether) → Shake → Separate organic layer & add ammonia. | Ammoniacal layer turns rose-pink or red. |
| Modified Borntrager's Test | C-Glycosides (e.g., Aloin, Cascariosides) | Drug powder + 5% FeCl ₃ + dilute HCl → Boil → Cool & Filter → Extract with benzene → Add ammonia. | Ammoniacal layer turns pink or red. |
| Keller-Kiliani Test | Deoxysugar (specifically Digitoxose) in Cardiac glycosides | Extract drug with alcohol → Add water & lead acetate → Filter → Extract filtrate with chloroform → Evaporate → Dissolve residue in glacial acetic acid + FeCl ₃ → Add conc. H ₂ SO ₄ along the sides. | A reddish-brown layer forms at the junction, and the upper layer turns bluish-green. |
| Legal Test | Cardiac Glycosides (Cardenolides) | Extract + Pyridine + Sodium nitroprusside → Make alkaline. | Pink to red colour. |
| Baljet Test | Cardiac Glycosides | Drug section + Sodium picrate solution. | Yellow to orange colour. |
| Raymond's Test | | Extract + m-dinitrobenzene in alcohol + alkali. | Violet colour. |
| Kedde's Test | | Extract + 3,5-dinitrobenzoic acid in alcohol + alkali. | Blue or violet colour. |
| Foam Test | Saponin Glycosides | Shake drug powder with water. | Persistent froth formation for several minutes. |
| Haemolysis Test | | Add drug extract to a drop of blood on a slide. | Rupturing of red blood cells (RBCs). |
| Liebermann-Burchard Test | Steroids & Triterpenoids | Drug extract in chloroform + Acetic anhydride + Conc. H ₂ SO ₄ . | Red → Blue → Green colour (for steroids). |
| Sodium Picrate Test | Cyanogenetic Glycosides | Moisten drug powder with water in a flask. Suspend a sodium picrate paper strip at the neck of the flask. | Paper turns from yellow to brick-red due to liberated HCN. |
| Shinoda Test | Flavonoid Glycosides | Drug extract in ethanol + Magnesium turnings + Conc. HCl. | Magenta, red or pink colour. |