**Lab3**

**Glycosides**

Glycosides are compounds that yield on hydrolysis, one or more sugar part and

another non-sugar part. The sugar part is known as glycone , and the non-sugar part is the aglycone. In general there are two basic classes of glycosides: C- glycosides, in which the sugar is attached to the aglycone through C-C bond, and the O- glycosides in which the sugar is connected to the aglycone through oxygen –carbon bond.

Chemically the glycosides are acetals in which the hydroxyl group (OH) of the glycone is condensed with the hydroxyl group of aglycone. More simply the glycosides may be considered as sugar ether. Two forms of glycosides are present, the α-form and the β-form, but the β-form is the one that occur in plants, even the hydrolytic enzymes act on this type.

Inside the body the glycosides will be cleaved to glycone and aglycone parts, the

glycone part confers on the molecule solubility properties, thus is important in the

absorption and distribution in the body, while the aglycone part is responsible for the pharmacological activity.

Generally all glycosides are hydrolyzed by boiling with mineral acids , on the other hand the presence of specific enzyme in the plant tissue, but in different cells from those that contain the glycosides, are able to hydrolyzed the glycosides, such as the emulsin enzyme which is present in the almond kernel, and the myrosin enzyme which is found in the black mustard seeds.

**Generally in the extraction of glycosides we have to consider the following points:**

1. Apolar solvent, which is mostly alcohol, but not water, since water may

induce fermentation, in addition water need high temperature due to its

high boiling point.

2. Neutralization of the extract with base, since the presence of acid lead

to hydrolysis of the glycoside.

3. Use of heat is to inhibit the activity of hydrolytic enzymes that present in

the plant cell.

**The glycosides are classified according to the chemical structure of the aglycone to:**

1. Cardioactive glycosides. 7. Alcohol glycosides.

2. Anthraquinone glycosides. 8. Aldehyde glycosides.

3. Saponin glycosides. 9. Lactone glycosides.

4. Cyanophore glycosides. 10. Phenol glycosides.

5. Isothiocyanate glycosides. 11. Miscellaneous glycosides.

6. Flavonoid glycosides.

Exp. No.1

Cardioactive Glycosides

They are named so, due to their action on the heart muscle. The aglycone part

here is steroid, which is chemically cyclopentaphenanthrene.

**The steroidal aglycones are of two types:**

1) Cardinolides(α-β unsaturated 5 – member lactone ring).

2) Bufadienolides (doubly unsaturated 6-member lactone ring).

The more prevalent in nature is cardinolides type

**Plants Containing CardioactiveGlycosides:**

1) Digitalis (digitalis or foxglove) Digitalis purpurea of the family Scrophulariaceae.

This plant contains anumber of glycosides as digitoxin , gitoxin and getaloxine.

2) Digitalis lanata of the same family, from which the digoxin is obtained.

3) The plant used in our laboratory is Nerium oleander of the family Apocyanaceae. The main glycoside of which is oleandrin.

**Anthraquinone Glycosides**

Anthraquinone and related glycosides, are stimulant cathartics, and exert their action by increasing the tone of the smooth muscle in the wall of colon and stimulate the secretion of water and electrolytes into the large intestine. After the oral administration, the anthraquinone glycosides are hydrolyzed in the colon by the action of enzymes of the micro flora, to the pharmacologically active free aglycones which usually produce their effect in 8 -12 hrs. After administration, these agents are indicated for constipation in patient who do not respond to milder drugs and for bowel evacuation before investigational procedure or surgery.

*Stimulant laxative are habit forming so the long-term use may result in laxative dependence and loss of normal bowel function.*

The glycosides of anthranols and anthrones elicit a more drastic reaction than do corresponding anthraquinone glycosides and cause discomforting and gripping action.

The drugs mostly used are cascara,frangula,hypericum and Senna. Aloe and Rhubarb are not recommended due to their irritating actions which increase the chance for gripping effect. The anthraquinone hydrolyzed to give aglycone which are di, tri, or tetra – hydroxyanthraquinone .Also there are antherone, dianthrones and oxanthrones.

**Saponin Glycosides**

This group of glycoside is widely distributed in higher plants. Saponin glycosides form colloidal solution in water that foam upon shaking, **this is due to a decrease in the surface tension action done by saponin glycosides**, as a result of the hydrophobic/ hydrophilic characteristics of the saponin, and due to this property the saponins are used in the manufacturing of beer, and soap.

Saponins have a bitter, acrid taste, and drugs containing them are usually sternutatory and otherwise irritating the mucus membrane.

They destroy red blood corpuscles by hemolysis and are toxic especially to cold blooded animals therefore many saponins are used as fish poisons. The more poisonous saponin is often called sapotoxin, many are toxic to insects and mollusks, and some are used to control schistosomiasis snails.

Saponin upon hydrolysis yield an aglycone known as sapogenin, which are crystallized upon acetylation, therefore this process is used for purification.

**According to the structure of the aglycone, two kinds of saponin are recognized**: 1. Pentacyclictriterpenoid saponins (acidic, and the C-atom is C30)

2. Steroidal saponins (neutral C- atom is C27).