Sub-Chapter XII

GLYCOSIDES AND VEGETABLE ALKALOIDS, NATURAL OR REPRODUCED BY SYNTHESIS, AND THEIR SALTS, ETHERS, ESTERS AND OTHER DERIVATIVES

GENERAL

In this Sub-Chapter, the term "derivatives" refers to chemical compounds which could be obtained from a starting compound of the heading concerned and which retain the essential characteristics of the parent compound, including its basic structure.

29.38 - Glycosides, natural or reproduced by synthesis, and their salts, ethers, esters and other derivatives.

2938.10 - Rutoside (rutin) and its derivatives

2938.90 - Other

Glycosides occur mainly in the vegetable kingdom. Usually, under the action of acids, bases or enzymes, they are split into a sugar part and a non-sugar part (aglycone). These parts are bonded to each other via the anomeric carbon atom of the sugar. Thus, products such as vacciniin and hamamelitannin of heading 29.40 are not considered to be glycosides.

The most common naturally-occurring glycosides are the O-glycosides, in which the sugar moiety and aglycone normally are linked by an acetal function. However, there are also naturally-occurring N-glycosides, S-glycosides and C-glycosides, in which the sugar's anomeric carbon is linked to the aglycone via a nitrogen atom, a sulphur atom or a carbon atom, respectively (e.g., casimiroedine (an N-glycoside) sinigrin (an S-glycoside) and aloin (a C-glycoside)). The aglycone is sometimes linked to the sugar by an ester group.

Glycosides are generally solid, colourless compounds; they form the reserve substances in vegetable organisms, or act as stimulants. Many are used for therapeutic purposes.

(1) **Rutoside** (rutin), found in many plants, especially the buckwheat plant (*Fagopyrum esculentum Moench.*, *Polygonaceae*) which contains about 3 % (dry basis).

(2) **Digitalis glycosides**, present in plants of the *Digitalis* genus (e.g., *D. lanata*, *D. purpurea*). Certain are important in medicine as heart stimulants. The group includes **digitoxin**, white crystalline powder, odourless, very toxic; **digoxin**; and **digitonin**, a saponin of digitalis, used as a chemical reagent.

(3) **Glycyrrhizin and glycyrrhizates**, present in liquorice root; colourless crystals. Ammonium glycyrrhizate is a reddish-brown mass used in the preparation of drinks. Glycyrrhizates are also used in medicine.

(4) **Strophanthin**, glycosides found in many species of the *Strophanthus* genus; very efficacious heart stimulants. Several are known, including **ouabain** or **Strophanthin-G**, in colourless crystals; very toxic.

(5) **Saponins**, amorphous glycosides fairly abundant in the vegetable kingdom; sternutatory properties. Their aqueous solutions froth when shaken. Used in medicine, in the manufacture of detergents and in foam fire extinguishers.

(6) **Aloin**, present in the leaves of various species of aloe.

(7) **Amygdalin**, contained in bitter almonds and various fruit stones. Used as expectorant.

(8) **Arbutin**, contained in leaves of arbutus; used as a diuretic.

(9) **Sinigrin**, present in black mustard seeds and horse radish root. Used in medicine.

This heading also includes certain tannin derivatives of natural or synthetically-reproduced glycosides.

This heading also covers **natural mixtures** of glycosides and of their derivatives (e.g., a natural mixture of digitalis glycosides containing purpurea glycosides A and B, digitoxin, gitoxin, gitaloxin, etc.); but deliberate intermixtures or preparations are **excluded**.

This heading also **excludes** :

(1) Nucleosides and nucleotides (**heading 29.34**).

(2) Alkaloids (e.g., tomatine) (**heading 29.39**).

(3) Non-natural glycosides (other than products of heading 29.37 or 29.39) in which the glycosidic linkage is an acetal function formed by etherification at the anomeric carbon (α-methylglucoside, tribenoside (INN)) (**heading 29.40**).

(4) Antibiotics (e.g., toyocamycin) (**heading 29.41**).