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ProductInformation

Saponin from Quillaja Bark

Product Numbers S7900 and S2149

Cas Number: 8047-15-2
Synonyms: Sapogenin Glycosides[1]

Structure

Quillaja saponaria saponin (Quillaja saponins) is a heterogenous mixture of molecules varying both in their aglycone and sugar moieties.[2] The main aglycone (sapogenin) moiety is quillaic acid, a triterpene of predominantly 30-carbon atoms (hydrophobic) of the Δ^{12}-oleanane type. The aglycone is bound to various sugars (hydrophilic) including glucose. Sapogenin devoid of any sugars can be isolated by acid hydrolysis of saponins.[3,4,5,6,7] The structures of some components isolated from the acylated triterpenoid saponin mixture of Quillaja saponaria were reported.[8,9]

Physical Description

Light yellow with a light tan cast powder. Sapogenin content is not less than 10%. The sulfated ash content is less than 20%.[10] Methods for the identification and quantitative determination of the aglycone and carbohydrate moieties of saponins have been reported.[2,4,11,12,13]

Method of Preparation

Quillaja saponin is obtained from the bark of the South American soaptree, Quillaja saponaria Molina (Rosaceae family). Saponin (S2149) is obtained by special extractions, removal of both undesirable accompanying substances from the extracts and undesirable solvents, and concentration among other processes.[3] A method of preparation has been reported.[2]

Stability / Storage as Supplied

Quillaja saponin is hygroscopic and should be stable stored desiccated.[10]

Solubility / Solution Stability

Quillaja saponin is soluble in water. A 50-100 mg/ml solution in deionized water may yield a hazy solution by sonication.[10] The solubility in water may be increased by additions of small amounts of alkali.[14] Quillaja saponin may be soluble in hot alcohol and is insoluble in most organic solvents. Aqueous solutions may froth when shaken; the froth can be dispersed by alcohol or ether.[14] Quillaja saponin solutions are not autoclavable. Solutions are only stable for about 5-10 minutes at 100°C and may be stable for a maximum of three days when stored at 0-4°C. It is recommended to prepare fresh solutions.[3]

Usage / Applications

Saponin (plant source not identified) solutions have been used in the following ways: concentrations of 0.005%-0.01% were used to permeabilize cultured human intestinal epithelial cells after incubation for 30' prior to immunofluorescence;[15] a 0.05% solution of saponin was reportedly used to permeabilize paraformaldehyde-saponin-fixed human fibroblasts for the staining of intracellular fibronectin by different types of peroxidase conjugates for light and electron microscopy;[16] saponins, a surface-active agent, have also been used to lyse the outer membranes of Rous sarcoma viruses, cell membranes of chicken liver and erythrocytes of human and guinea pig. Washed erythrocytes were suspended in isotonic saline and lysed by pouring into aqueous or saline solutions of saponin. Hemolysis was complete at 37°C for 30 minutes. At a saponin concentration of 0.05%, a large number of pits in the erythrocyte cell membrane was observed by electron microscopy whereby a 0.09% saponin concentration effected complete dissolution of the erythrocyte ghosts.[17]

Partially purified Quillaja saponins were reported to associate with hydrophobic or amphipathic proteins and lipids to form detergent/lipid/saponin complexes termed ISCOM (immunostimulating complexes). The ISCOMs, depending on the preparation, may induce serum antibody titers which are about 10-fold higher than titers produced by immunization with protein micelles alone.[18] The isolation and quantification of purified Quillaja saponins and lipids in ISCOMS have been described.[19] Orally fed Quillaja saponin was reported to enhance the immunopotentiating ability of an intraperitoneally administered inactivated rabies vaccine in mice.[20] Purified saponin from crude Quillaja

saponaria amplified antigen-specific immune responses to an experimental HIV-1 vaccine [21] and potentiated an immune response elicited by albumin and venom both in mice.[22] Quillaja saponin has been shown to influence cholesterol metabolism and blood lipid profiles in animals. For casein-fed animals but non soy-fed, saponin significantly lowered the LDL cholesterol and LDL/HDL ratios but had no influence on the serum lipids of isolated soy protein (ISP)-fed animals. These results suggest that Quillaja saponins may interact differently with different proteins.[23]

General Notes

Saponins are plant glycosides which are widely distributed in plants. Saponins may also be powerful emulsifiers having hemolytic ability[1] (and therefore toxic) which may be related to their binding to cholesterol in cell membranes. Some saponins, like certain purified fractions of Quillaja saponaria, have been shown to have adjuvant activity.[6,11,18-22,24] Other properties which may vary among the saponins include foaming when shaken in aqueous solutions, formation of molecular compounds with cholesterol and other hydroxy steroids, toxicity to fish and amphibians, formation of emulsions with oils, formation of mixed micelles with bile acids and properties of a protective colloid and a bitter taste.[4,5,25,26] Saponin has been used for the direct determination of metals in milk by flame atomic-absorption spectrophotometry.[27]

References

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