Ammonium Glycyrrhizate

1 Nonproprietary Names

BP: Ammonium Glycyrrhizinate

PhEur: Ammonium Glycyrrhizate

USP–NF: Ammonium Glycyrrhizate

2 Synonyms

Ammoniated glycyrrhizin; ammonium glycyrrhizinate; α-D-glucopyranosiduric acid, (3β,20β)-20-carboxy-11-oxo-30-norlean-12-en-3-yl-2-*O*-β-D-glucopyranuronosyl-, ammoniate; glycamil; glycyram; glycyrram; glycyrrhizic acid ammonium salt; glycyrrhizic acid, monoammonium salt; mag; *Magnasweet*; monoammonium glycyrrhizate; monoammonium glycyrrhizinate.

3 Chemical Name and CAS Registry Number

α-D-Glucopyranosiduric acid, (3β,20β)-20-carboxy-11-oxo-30-norlean-12-en-3-yl-2-*O*-β-D-glucopyranuronosyl-, monoammonium salt; anhydrous [53956-04-0]

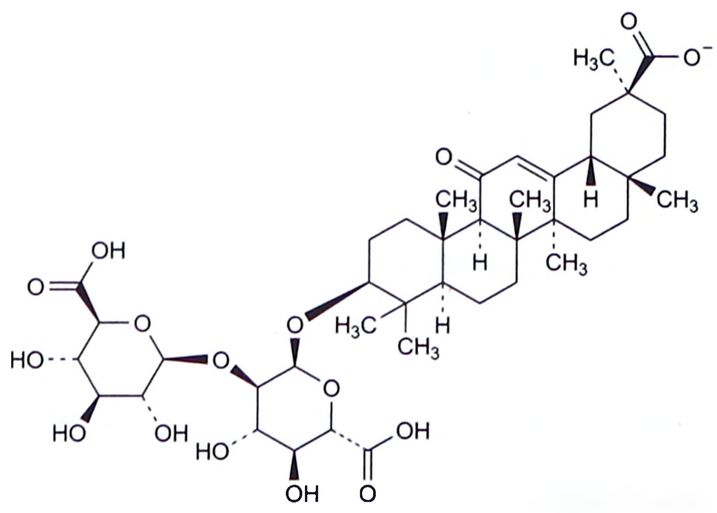
α-D-Glucopyranosiduric acid, (3β,20β)-20-carboxy-11-oxo-30-norlean-12-en-3-yl-2-*O*-β-D-glucopyranuronosyl-, monoammonium salt; pentahydrate [1407-03-0]

The USP 40–NF 35 S1 and PhEur 9.2 describe ammonium glycyrrhizate as a mixture of ammonium 18α- and 18β-glycyrrhizate (ammonium salt of (20β)-3β-[[2-*O*-(β-D-glucopyranosyluronic acid)-α-D-glucopyranosyluronic acid]oxy]-11-oxoolean-12-en-29-oic acid), the 18β-isomer being the main component.

4 Empirical Formula and Molecular Weight

$C_{42}H_{65}NO_{16}$ (anhydrous)	840.08
$C_{42}H_{65}NO_{16}\cdot 5H_2O$ (pentahydrate)	930.04

5 Structural Formula



6 Functional Category

Emulsifying agent; flavoring agent; sweetening agent; taste-masking agent

7 Applications in Pharmaceutical Formulation or Technology

Ammonium glycyrrhizate is an intense sweetening agent, approximately 50 times sweeter than sucrose. It is used as a flavoring and taste-masking agent[1,2] in oral pharmaceutical formulations, and it is also used to stabilize emulsions.[3]

It has also been investigated as a penetration enhancer in a topical gel preparation of idoxuridine.[4]

8 Description

Ammonium glycyrrhizate occurs as a white to yellowish-white or brown, hygroscopic powder, with an intensely sweet taste.

9 Pharmacopeial Specifications

See Table I.

Table I: Pharmacopeial specifications for ammonium glycyrrhizate.

Test	PhEur 9.2	USP 40–NF 35 S1
Identification	+	+
Characters	+	—
Appearance of solution	+	—
Specific optical rotation (anhydrous)	+49.0 to +54.0	+49.0 to +55.0
Related substances	+	—
Water	≤6.0%	≤6.0%
Sulfated ash	≤0.2%	—
Residue on ignition	—	≤0.5%
Organic impurities		
24-Hydroxy-glycyrrhizinic acid	—	≤5.7%
Other impurities	—	≤2.0%
Sum of other impurities	—	≤8.0%
Assay (anhydrous)		
18α- and 18β-glycyrrhizate	98.0–102.0%	78.0–102.0%
18α-glycyrrhizate	—	≤13.0%

10 Typical Properties

Absorption maximum UV max: 248 nm (ε 11400) (pentahydrate)

Acidity/alkalinity pH = 4.5 (6×10^{-5} M aqueous solution)[5]

Melting point 209°C with decomposition (anhydrous); 212–217°C with decomposition (pentahydrate)

Solubility Soluble in ammonia solution and glacial acetic acid; slightly soluble in water; very slightly soluble in anhydrous ethanol; practically insoluble in acetone.

11 Stability and Storage Conditions

Ammonium glycyrrhizate should be stored in tight containers in a cool, dry place.

Stability studies have indicated ammonium glycyrrhizate is thermostable and photostable between pH 7–9.[5,6]

12 Incompatibilities

Ammonium glycyrrhizate is incompatible with strong oxidizing agents.

13 Method of Manufacture

Ammonium glycyrrhizate is the ammonium salt of glycyrrhizic acid. It is prepared by the acid precipitation of aqueous licorice extract from the roots of Glycyrrhiza glabra, followed by neutralization with ammonia to produce ammoniated glycyrrhizin. Further solvent extraction and separation produces ammonium glycyrrhizate.[7]

14 Safety

Ammonium glycyrrhizate is widely used in foods, cosmetics and oral pharmaceutical preparations, and is generally regarded as safe