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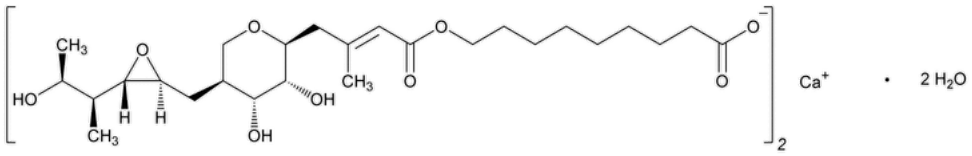
Mupirocin Calcium

Change to read:



$C_{52}H_{86}CaO_{18} \cdot 2H_2O$ ▲1075.35▲ (ERR 1-May-2022)

Nonanoic acid, 9-[[3-methyl-1-oxo-4-[tetrahydro-3,4-dihydroxy-5-[[3-(2-hydroxy-1-methylpropyl)oxiranyl]methyl]-2*H*-pyran-2-yl]-2-butenyl]oxy-, calcium salt (2:1), dihydrate, [2*S*-[2α(*E*),3β,4β,5α[2*R**,3*R**(1*R**,2*R**)]]]-;
(α*E*,2*S*,3*R*,4*R*,5*S*)-5-[(2*S*,3*S*,4*S*,5*S*)-2,3-Epoxy-5-hydroxy-4-methylhexyl]tetrahydro-3,4-dihydroxy-β-methyl-2*H*-pyran-2-crotonic acid, ester with 9-hydroxynonanoic acid, calcium salt (2:1), dihydrate CAS RN®: 115074-43-6; UNII: RG38I2P540.

DEFINITION

Mupirocin Calcium contains the equivalent of NLT 865 µg/mg and NMT 936 µg/mg of mupirocin ($C_{26}H_{44}O_9$).

IDENTIFICATION

- **A. Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*:** 197M or 197A

  Sample: Do not grind extensively.

  Acceptance criteria: Meets the requirements
- **B.** The retention time of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.
- **C. Identification Tests—General ⟨191⟩, *Chemical Identification Tests, Calcium***

  Sample solution: Mupirocin Calcium in methanol (1:20)

  Acceptance criteria: Meets the requirements

ASSAY

- **Procedure**

  Buffer: 7.7 g/L of ammonium acetate in water. Adjust with acetic acid, glacial to a pH of 5.7 before diluting to the final volume.

  Mobile phase: Tetrahydrofuran and *Buffer* (32:68)

  Standard solution: 0.125 mg/mL of USP Mupirocin Lithium RS prepared as follows. Transfer a suitable amount of USP Mupirocin Lithium RS to a suitable volumetric flask, dissolve in methanol using 2.5% of the final volume, and dilute with *Buffer* to volume.

  System suitability solution: Adjust 10 mL of the *Standard solution* with 6 N hydrochloric acid to a pH of 2.0, allow to stand for 20 h, and adjust with 5 N sodium hydroxide to a pH of 4.0.

  Sample solution: 0.125 mg/mL of Mupirocin Calcium prepared as follows. Transfer a suitable amount of Mupirocin Calcium to a suitable volumetric flask, dissolve in 2.5% of the final volume of methanol, and dilute with *Buffer* to volume.

  Chromatographic system

  (See *Chromatography ⟨621⟩, System Suitability*.)

  Mode: LC

  Detector: UV 230 nm

  Column: 4.6-mm × 25-cm; 5-µm packing L7

  Flow rate: 1 mL/min

  Injection volume: 20 µL

  System suitability

  Samples: *Standard solution* and *System suitability solution*

  Suitability requirements

  Resolution: NLT 7.0 between the mupirocin pyranyl analog and mupirocin, *System suitability solution*

  Relative standard deviation: NMT 1.0%, *Standard solution*

  Analysis

  Samples: *Standard solution* and *Sample solution*

  Calculate the quantity, in µg/mg, of mupirocin ($C_{26}H_{44}O_9$) in the portion of Mupirocin Calcium taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times P$$

r_U = peak area of mupirocin from the *Sample solution*

r_S = peak area of mupirocin from the *Standard solution*

C_S = concentration of USP Mupirocin Lithium RS in the *Standard solution* (mg/mL)

C_U = concentration of Mupirocin Calcium in the *Sample solution* (mg/mL)

P = potency of mupirocin in USP Mupirocin Lithium RS (µg/mg)

Acceptance criteria: 865–936 µg/mg

IMPURITIES

• **Chloride and Sulfate ⟨221⟩, *Chloride***

Analysis: Dissolve 50 mg in a mixture of 1 mL of 2 N nitric acid and 15 mL of methanol. Add 1 mL of silver nitrate TS.

Acceptance criteria: The turbidity does not exceed that produced by 0.70 mL of 0.020 N hydrochloric acid (0.5%).

Change to read:

• **Organic Impurities**

Buffer: Prepare as directed in the *Assay*.

Solution A: 13.6 g/L of sodium acetate in water. Adjust with acetic acid, glacial to a pH of 4.0 before diluting to the final volume.

Mobile phase: Tetrahydrofuran and *Buffer* (30:70)

Diluent: Methanol and *Solution A* (1:1)

Standard solution: 0.125 mg/mL of USP Mupirocin Lithium RS in *Diluent*

System suitability solution: Adjust 10 mL of the *Standard solution* with 6 N hydrochloric acid to a pH of 2.0, allow to stand for 20 h, and adjust with 5 N sodium hydroxide to a pH of 4.0.

Sensitivity solution: 0.0025 mg/mL of mupirocin lithium prepared from the *Standard solution*.

Sample solution: 5 mg/mL of Mupirocin Calcium in *Diluent*

Chromatographic system

(See *Chromatography ⟨621⟩, System Suitability*.)

Mode: LC

Detector: UV 240 nm

Column: 4.6-mm × 25-cm; 5-µm packing L7

Autosampler temperature: 5°

Flow rate: 1 mL/min

Injection volume: 20 µL

Run time: NLT 3 times the retention time of mupirocin

System suitability

Samples: *Standard solution*, *System suitability solution*, and *Sensitivity solution*

[Note— See *Table 1* for relative retention times.]

Suitability requirements

Resolution: NLT 7.0 between the mupirocin pyranyl analog and mupirocin, *System suitability solution*

Tailing factor: NMT 2 for the mupirocin peak, *Standard solution*

Relative standard deviation: NMT 5% for the mupirocin peak, *Standard solution*

Signal-to-noise ratio: NLT 10 for the mupirocin peak, *Sensitivity solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of any individual impurity in the portion of Mupirocin Calcium taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times P \times F \times 100$$

r_U = peak area of any individual impurity from the *Sample solution*

r_S = peak area of mupirocin from the *Standard solution*

C_S = concentration of USP Mupirocin Lithium RS in the *Standard solution* (mg/mL)

C_U = concentration of Mupirocin Calcium in the *Sample solution* (mg/mL)

P = potency of mupirocin in USP Mupirocin Lithium RS (µg/mg)

F = conversion factor, 0.001 mg/µg

Acceptance criteria: See *Table 1*. The reporting threshold is 0.05%.

Table 1

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Pseudomonic acid N[a]	0.45	1
Mupirocin furonyl analog[b]	0.63	1
Mupirocin pyranyl analog[c]	0.66	1
Pseudomonic acid D[d]	0.75	2.5
Pseudomonic acid B[e]	0.90	1
Mupirocin	1.0	—
Pseudomonic acid C[f]	2.24	1
Pseudomonic acid E[g]	2.65	0.5
Any unspecified impurity	—	0.5
Total impurities	—	4.5

[a] 7-{(*E*)-4-[(2*S*,3*R*,4*R*,5*S*)-3,4-Dihydroxy-5-({(2*S*,3*S*)-3-[(2*S*,3*S*)-3-hydroxybutan-2-yl]oxiran-2-yl}methyl)tetrahydro-2*H*-pyran-2-yl]-3-methylbut-2-enoyloxy}heptanoic acid.

▲[b] 9-{(*E*)-4-[(2*R*,3a*S*,6*S*,7*S*)-2-{(1*RS*,2*S*,3*S*)-1,3-Dihydroxy-2-methylbutyl}-7-hydroxyhexahydro-2*H*-furo[3,2-c]pyran-6-yl]-3-methylbut-2-enoyloxy}nonanoic acid.▲ (ERR 1-May-2022)

[c] 9-{(*E*)-4-[(2*R*,3*RS*,4*aS*,7*S*,8*S*,8a*R*)-3,8-Dihydroxy-2-{(2*S*,3*S*)-3-hydroxybutan-2-yl}octahydropyrano[3,2-c]pyran-7-yl]-3-methylbut-2-enoyloxy}nonanoic acid.

[d] (*E*)-9-{(*E*)-4-[(2*S*,3*R*,4*R*,5*S*)-3,4-Dihydroxy-5-({(2*S*,3*S*)-3-[(2*S*,3*S*)-3-hydroxybutan-2-yl]oxiran-2-yl}methyl)tetrahydro-2*H*-pyran-2-yl]-3-methylbut-2-enoyloxy}non-4-enoic acid.

[e] 9-{(*E*)-3-Methyl-4-[(2*S*,3*R*,4*S*,5*R*)-3,4,5-trihydroxy-5-({(2*S*,3*S*)-3-[(2*S*,3*S*)-3-hydroxybutan-2-yl]oxiran-2-yl}methyl)tetrahydro-2*H*-pyran-2-yl]but-2-enoyloxy}nonanoic acid.

[f] 9-((*E*)-4-{(2*S*,3*R*,4*R*,5*S*)-3,4-Dihydroxy-5-[(4*R*,5*S*,*E*)-5-hydroxy-4-methylhex-2-enyl]tetrahydro-2*H*-pyran-2-yl}-3-methylbut-2-enoyloxy)nonanoic acid.

[g] 11-{(*E*)-4-[(2*S*,3*R*,4*R*,5*S*)-3,4-Dihydroxy-5-({(2*S*,3*S*)-3-[(2*S*,3*S*)-3-hydroxybutan-2-yl]oxiran-2-yl}methyl)tetrahydro-2*H*-pyran-2-yl]-3-methylbut-2-enoyloxy}undecanoic acid.

SPECIFIC TESTS

- **Optical Rotation** ⟨781S⟩, *Procedures, Specific Rotation*
  Sample solution: 50 mg/mL in methanol
  Acceptance criteria: −16° to −20°
- **Water Determination** ⟨921⟩, *Method I*: 3.0%–4.5%

ADDITIONAL REQUIREMENTS

- **Packaging and Storage:** Preserve in tight containers. Store at controlled room temperature.
- **USP Reference Standards** ⟨11⟩
  USP Mupirocin Calcium RS
  USP Mupirocin Lithium RS
  Lithium 9-{(*E*)-4-[(2*S*,3*R*,4*R*,5*S*)-3,4-dihydroxy-5-({(2*S*,3*S*)-3-[(2*S*,3*S*)-3-hydroxybutan-2-yl]oxiran-2-yl}methyl)tetrahydro-2*H*-pyran-2-yl]-3-methylbut-2-enoyloxy}nonanoate.
  $C_{26}H_{43}LiO_9$ 506.56

Auxiliary Information - Please check for your question in the FAQs before contacting USP.

Topic/Question	Contact	Expert Committee
MUPIROCIN CALCIUM	Documentary Standards Support	SM12020 Small Molecules 1

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
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