Status: Currently Official on 15-Feb-2025
Official Date: Official as of 01-May-2022
Document Type: USP Monographs
DocId: GUID-923961F5-304D-4264-A068-C381CDEF6872_3_en-US
DOI: https://doi.org/10.31003/USPNF_M55038_03_01
DOI Ref: wsi8n

Mupirocin Ointment

DEFINITION
Mupirocin Ointment contains NLT 90.0% and NMT 110.0% of the labeled amount of mupirocin ($C_{26}H_{44}O_9$).

IDENTIFICATION
- **A.** The retention time of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.
- **B.** The UV spectrum of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

ASSAY
- **Procedure**

Buffer: 6.0 g/L of sodium phosphate, monobasic. Adjust with 10 N sodium hydroxide TS to a pH of 6.3.

Mobile phase: Acetonitrile and *Buffer* (1:3)

Standard solution: 0.11 mg/mL of USP Mupirocin Lithium RS prepared as follows. Transfer a suitable amount of USP Mupirocin Lithium RS to an adequate volumetric flask, add 25% of the total volume of acetonitrile, and swirl to dissolve. Dilute with *Buffer* to volume.

System suitability solution: Adjust 10 mL of *Standard solution* with 6 N hydrochloric acid TS to a pH of 2.0, allow to stand for 2 h, and adjust with 5 N sodium hydroxide TS to a pH of 6.3.

Sample solution: Nominally 0.1 mg/mL of mupirocin from Ointment prepared as follows. Dissolve a quantity of Ointment, equivalent to 10 mg of mupirocin, in 25 mL of acetonitrile. Transfer this solution, with the aid of *Buffer*, to a 100-mL volumetric flask, and dilute with *Buffer* to volume.

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

Mode: LC

Detector: UV 229 nm. For *Identification B*, use a diode array detector in the range of 200–400 nm.

Column: 4.6-mm × 25-cm; 10-µm packing L1

Flow rate: 2 mL/min

Injection volume: 20 µL

System suitability

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

Suitability requirements

Resolution: NLT 2.0 between mupirocin pyranyl analog and mupirocin, *System suitability solution*

[Note— Two hydrolysis products are formed, with the following elution order: mupirocin furonyl analog, mupirocin pyranyl analog, and mupirocin.]

Tailing factor: NMT 2, *Standard solution*

Relative standard deviation: NMT 2.0%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of mupirocin ($C_{26}H_{44}O_9$) in the portion of Ointment taken:

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

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

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

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

C_U = nominal concentration of mupirocin 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: 90.0%–110.0%

IMPURITIES

Change to read:

• **Organic Impurities**

Solution A: 10.5 g/L of ammonium acetate. Adjust with acetic acid, glacial to a pH of 5.7.

Solution B: Tetrahydrofuran and water (1:1)

Solution C: 13.6 g/L of sodium acetate, anhydrous. Adjust with acetic acid, glacial to a pH of 4.0.

Mobile phase: See *Table 1*.

Table 1

Time (min)	Solution A (%)	Solution B (%)
0	58	42
25	58	42
45	20	80
60	20	80
65	58	42
75	58	42

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

System suitability solution: 0.1 mg/mL of USP Mupirocin Lithium RS in *Diluent*. Adjust with 6 N Hydrochloric Acid TS to a pH of 2.0 and allow to stand for 2 h.

Sensitivity solution: 0.002 mg/mL of mupirocin from USP Mupirocin Lithium RS in *Diluent*

Standard solution: 0.025 mg/mL of mupirocin from USP Mupirocin Lithium RS in *Diluent*

Sample solution: Nominally 5 mg/mL of mupirocin in *Diluent*, prepared as follows. Accurately weigh 5.0 g of Ointment (equivalent to about 100 mg of mupirocin) and transfer it to a 50-mL glass centrifuge test tube. Add 20.0 mL of *Diluent* and sonicate in ice cold water for 5 min to dissolve. Pass through a suitable filter prior to use. Use freshly prepared solution.

Chromatographic system

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

Mode: LC

Detector: UV 240 nm

Column: 4.6-mm × 25-cm; 5-µm packing L1

Column temperature: 30°

Flow rate: 1.0 mL/min

Injection volume: 20 µL

System suitability

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

Suitability requirements

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

Relative standard deviation: NMT 5.0%, *Standard solution*

Signal-to-noise ratio: NLT 10, *Sensitivity solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of each impurity in the portion of Ointment taken:

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

r_U = peak area of any 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 = nominal concentration of mupirocin 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 2*. The reporting threshold is 0.04%.

Table 2

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Pseudomonic acid N[a]	0.29	1.0
Mupirocin furonyl analog[b]	0.53	3.00
Mupirocin pyranyl analog[c]	0.56	5.00
Pseudomonic acid D[d]	0.66	3.0
Pseudomonic acid B[e]	0.87	1.0
Mupirocin	1.00	—
Pseudomonic acid C[f]	1.41	1.0
Any other individual impurity	—	1.0

[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.

PERFORMANCE TESTS

• **Minimum Fill ⟨755⟩:** Meets the requirements

SPECIFIC TESTS

• **Microbial Enumeration Tests ⟨61⟩** and **Tests for Specified Microorganisms ⟨62⟩:** The total aerobic microbial count does not exceed 10^2 cfu/g.The total combined molds and yeasts count does not exceed 10^1 cfu/g. It meets the requirements of the tests for the absence of *Staphylococcus aureus* and *Pseudomonas aeruginosa*.

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in collapsible tubes or well-closed containers. Store at controlled room temperature.

• **USP Reference Standards ⟨11⟩**

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 OINTMENT	Documentary Standards Support	SM12020 Small Molecules 1

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. 45(4)
Current DocID: GUID-923961F5-304D-4264-A068-C381CDEF6872_3_en-US
DOI: https://doi.org/10.31003/USPNF_M55038_03_01
DOI ref: wsi8n