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Betamethasone Valerate Ointment

DEFINITION

Betamethasone Valerate Ointment contains an amount of betamethasone valerate ($C_{27}H_{37}FO_6$) equivalent to NLT 90.0% and NMT 110.0% of the labeled amount of betamethasone ($C_{22}H_{29}FO_5$), in a suitable ointment base.

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**

Solution A: Water

Solution B: Acetonitrile

Mobile phase: See *Table 1*.

Table 1

Time (min)	Solution A (%)	Solution B (%)
0.0	63	37
7.0	63	37
15.0	30	70
19.0	30	70
19.1	10	90
21.0	10	90
21.1	63	37
25.0	63	37

Diluent A: Tetrahydrofuran and water (50:50)

Diluent B: Acetonitrile and water (40:60)

System suitability solution: 25 µg/mL of USP Betamethasone Valerate RS and 10 µg/mL of USP Betamethasone Valerate Related Compound A RS in *Diluent B*. Sonicate to dissolve if necessary.

Standard solution: 25 µg/mL of USP Betamethasone Valerate RS in *Diluent B*. Sonicate to dissolve if necessary.

Sample solution: Nominally 20 µg/mL of betamethasone, prepared as follows. Transfer 1.0 mg of betamethasone from a portion of Ointment to a suitable glass centrifuge tube. Add 15.0 mL of *Diluent A* and mix with a vortex mixer to disperse the sample thoroughly. Add 35.0 mL of *Diluent B* and sonicate for 10 min with intermittent shaking. Centrifuge to obtain a clear supernatant and use the clear supernatant.

Chromatographic system

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

Mode: LC

Detector: UV 240 nm. For *Identification B*, use a diode array detector in the range of 200–400 nm.

Column: 4.6-mm × 15-cm; 3.5-µm packing L1

Flow rate: 1 mL/min

Injection volume: 100 µL

Autosampler temperature: 4°

System suitability

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

[NOTE—See *Table 2* for relative retention times.]

Suitability requirements

Resolution: NLT 2.0 between betamethasone valerate and betamethasone valerate related compound A, *System suitability solution*

Tailing factor: NMT 2.0, *Standard solution*

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

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of betamethasone ($C_{22}H_{29}FO_5$) in the portion of Ointment taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (M_{r1}/M_{r2}) \times 100$$

r_U = peak response from the *Sample solution*

r_S = peak response from the *Standard solution*

C_S = concentration of USP Betamethasone Valerate RS in the *Standard solution* (µg/mL)

C_U = nominal concentration of betamethasone in the *Sample solution* (µg/mL)

M_{r1} = molecular weight of betamethasone, 392.46

M_{r2} = molecular weight of betamethasone valerate, 476.58

Acceptance criteria: 90.0%–110.0%

IMPURITIES

• **ORGANIC IMPURITIES**

Solution A, Solution B, Mobile phase, Diluent A, Diluent B, System suitability solution, Sample solution, and **Chromatographic system:** Proceed as directed in the *Assay*.

Standard solution: 0.25 µg/mL each of USP Betamethasone RS, USP Betamethasone Valerate RS, and USP Betamethasone Valerate Related Compound A RS in *Diluent B*. Sonicate to dissolve if necessary.

System suitability

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

[NOTE—See *Table 2* for relative retention times.]

Suitability requirements

Resolution: NLT 2.0 between betamethasone valerate and betamethasone valerate related compound A, *System suitability solution*

Tailing factor: NMT 2.0, *Standard solution*

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

Analysis

Samples: *Sample solution* and *Standard solution*

Calculate the percentage of each specified degradation product in the portion of Ointment taken:

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

r_U = peak response of each specified degradation product from the *Sample solution*

r_S = peak response of the corresponding USP Reference Standard from the *Standard solution*

C_S = concentration of the corresponding USP Reference Standard in the *Standard solution* (µg/mL)

C_U = nominal concentration of betamethasone in the *Sample solution* (µg/mL)

Calculate the percentage of each unspecified degradation product in the portion of Ointment taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (M_{r1}/M_{r2}) \times 100$$

r_U = peak response of each unspecified degradation product from the *Sample solution*

r_S = peak response of betamethasone valerate from the *Standard solution*

C_S = concentration of USP Betamethasone Valerate RS in the *Standard solution* (µg/mL)

C_U = nominal concentration of betamethasone in the *Sample solution* (µg/mL)

M_{r1} = molecular weight of betamethasone, 392.46

M_{r2} = molecular weight of betamethasone valerate, 476.58

Acceptance criteria: See *Table 2*. Disregard any impurity peak less than 0.1%.

Table 2

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Betamethasone	0.30	1.0
Betamethasone valerate	1.00	—
Betamethasone valerate related compound A	1.04	1.0
Any individual unspecified degradation product	—	1.0
Total degradation products	—	2.0

SPECIFIC TESTS

• **Microbial Enumeration Tests ⟨61⟩** and **Tests for Specified Microorganisms ⟨62⟩:** Meets the requirements of the tests for absence of *Staphylococcus aureus* and *Pseudomonas aeruginosa*

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

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in collapsible tubes or in tight containers, and avoid exposure to excessive heat.

• **USP Reference Standards ⟨11⟩**

USP Betamethasone RS

USP Betamethasone Valerate RS

USP Betamethasone Valerate Related Compound A RS

9-Fluoro-11β,17-dihydroxy-16β-methyl-3,20-dioxopregna-1,4-dien-21-yl valerate.

$C_{27}H_{37}FO_6$ 476.58

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

Topic/Question	Contact	Expert Committee
BETAMETHASONE VALERATE OINTMENT	Documentary Standards Support	SM52020 Small Molecules 5
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM52020 Small Molecules 5

Chromatographic Database Information: Chromatographic Database

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