

Triamcinolone Acetonide Nasal Spray

DEFINITION
Triamcinolone Acetonide Nasal Spray is an aqueous suspension of Triamcinolone Acetonide. It is supplied in a form suitable for nasal administration. It contains NLT 90.0% and NMT 110.0% of the labeled amount of triamcinolone acetonide ($C_{24}H_{31}FO_6$).

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 A: 3.4 g/L of [monobasic potassium phosphate](#) prepared as follows. Dissolve 3.4 g of [monobasic potassium phosphate](#) in 900 mL of [water](#), adjust with 5 M [sodium hydroxide](#) to a pH of 7.0, and dilute with [water](#) to 1000 mL.

Buffer B: 3.4 g/L of [monobasic potassium phosphate](#) prepared as follows. Dissolve 3.4 g of [monobasic potassium phosphate](#) in 900 mL of [water](#), adjust with [phosphoric acid](#) to a pH of 3.0, and dilute with [water](#) to 1000 mL.

Solution A: [Acetonitrile](#) and Buffer A (27.5: 72.5)

Solution B: [Acetonitrile](#) and Buffer A (60:40)

Mobile phase: See [Table 1](#).

Table 1

Time (min)	Solution A (%)	Solution B (%)
0	100	0
30	60	40
30.1	0	100
44	0	100
44.1	100	0
52	100	0

Diluent: [Acetonitrile](#) and Buffer B (27.5: 72.5)

Standard stock solution: 0.4 mg/mL of [USP Triamcinolone Acetonide RS](#) in [acetonitrile](#). Sonication for 15 min may be used to aid in dissolution.

Standard solution: 40 µg/mL of [USP Triamcinolone Acetonide RS](#) from *Standard stock solution* in *Diluent*

System suitability stock solution: 0.04 mg/mL of [USP Triamcinolone Acetonide Related Compound B RS](#) and [USP Triamcinolone Acetonide Related Compound C RS](#) in *Diluent*

System suitability solution: 40 µg/mL of [USP Triamcinolone Acetonide RS](#) and 0.8 µg/mL each of [USP Triamcinolone Acetonide Related Compound B RS](#) and [USP Triamcinolone Acetonide Related Compound C RS](#) from suitable volumes of *Standard stock solution* and *System suitability stock solution* in *Diluent*

Sample solution: Nominally 40 µg/mL of triamcinolone acetonide prepared as follows. Discharge the contents of NLT 5 units of Nasal Spray to a suitable container. Transfer a portion of the Nasal Spray, equivalent to 4 mg of triamcinolone acetonide to a 100-mL volumetric flask.

Dissolve in 28 mL of [acetonitrile](#) with the aid of sonication. Allow to cool to room temperature and dilute with *Buffer B* to volume. Sonicate, if necessary. Centrifuge and use the clear supernatant [NOTE—Centrifuging at 3600 rpm for 30 min may be suitable.]

Chromatographic system

(See [Chromatography \(621\)](#), [System Suitability](#).)

Mode: LC

Detector: UV 239 nm. For *Identification B*, use a diode array detector in the range of 210–400 nm.

Column: 4.6-mm × 25-cm; 5-μm packing [L1](#)

Column temperature: 40°

Flow rate: 0.75 mL/min

Injection volume: 100 μL

System suitability

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

[NOTE—See [Table 4](#) for the relative retention times.]

Suitability requirements

Resolution: NLT 3.0 between triamcinolone acetonide related compound C and triamcinolone acetonide related compound B; NLT 3.0 between triamcinolone acetonide related compound B and triamcinolone acetonide, *System suitability solution*

Tailing factor: NMT 1.3 for triamcinolone acetonide, *System suitability solution*

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

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of triamcinolone acetonide ($C_{24}H_{31}FO_6$) in the portion of Nasal Spray taken:

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

r_U = peak response from the *Sample solution*

r_S = peak response from the *Standard solution*

C_S = concentration of [USP Triamcinolone Acetonide RS](#) in the *Standard solution* (μg/mL)

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

Acceptance criteria: 90.0%–110.0%

OTHER COMPONENTS

• CONTENT OF EDETATE DISODIUM

Perform this test if edetate disodium is a known component in the Nasal Spray.

Buffer: Add 990 mL of [water](#) into a 1000-mL beaker, followed by 10.0 mL of [1.0 M tetrabutylammonium hydroxide in methanol](#). Adjust with [phosphoric acid](#) to a pH of 7.0.

Mobile phase: [Acetonitrile](#) and *Buffer* (15:85)

Solution A: 40 g/L of [sodium chloride](#) and 2 g/L of [sodium acetate](#). Adjust with [glacial acetic acid](#) to a pH of 5.5.

Solution B: 1.0 g/L of [cupric sulfate](#) in [water](#)

Diluent: [Acetonitrile](#) and [water](#) (50:50)

Standard stock solution: 0.5 mg/mL of [edetate disodium](#) in [water](#). Sonication may be used to aid in dissolution.

Standard solution: 0.05 mg/mL of [edetate disodium](#). Transfer 5.0 mL of *Standard stock solution* to a 50-mL volumetric flask. Next add 10 mL of *Solution A* and then add 5.0 mL of [acetonitrile](#). Mix the resulting solution and then add 20.0 mL of *Solution B*, dilute with *Diluent* to volume, and mix.

Sample solution: Combine the contents of NLT 5 units of Nasal Spray and mix the contents to obtain a composite suspension. Transfer a 5.0-g portion of the Nasal Spray to a 50-mL volumetric flask. Add 10 mL of *Solution A* and 5.0 mL of [acetonitrile](#). Mix and sonicate for 10 min and allow the solution to equilibrate to room temperature. Add 20.0 mL of *Solution B*, and sonicate for 10 min. Allow the sample to equilibrate to room temperature and dilute with *Diluent* to volume. Centrifuge a portion for 15 min, and use the supernatant. [NOTE—Centrifuging at 4000 rpm for 15 min may be suitable.]

Chromatographic system

(See [Chromatography \(621\)](#), [System Suitability](#).)

Mode: LC

Detector: UV 265 nm

Column: 4.1-mm × 15-cm; 5-μm packing [L21](#)

Flow rate: 1 mL/min
Injection volume: 25 µL
System suitability
Sample: *Standard solution*
Suitability requirements
Tailing factor: NMT 2.0
Relative standard deviation: NMT 2.0%

Analysis

Samples: *Standard solution* and *Sample solution*
Calculate the percentage of edetate disodium (C₁₀H₁₄N₂Na₂O₈) in the portion of Nasal Spray taken:

Result = $(r_U/r_S) \times C_S \times (V/W) \times 100$

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of edetate disodium in the *Standard solution* (mg/mL)
V = volume of the *Sample solution* (mL)
W = weight of Nasal Spray in the *Sample solution* (mg)

Acceptance criteria: 0.045%–0.055%

Change to read:

• **CONTENT OF BENZALKONIUM CHLORIDE**

Perform this test if benzalkonium chloride is a known component in the Nasal Spray.

Buffer: Dissolve 10.8 g of [monobasic sodium phosphate dihydrate](#) in 90 mL of [water](#), and adjust with [phosphoric acid](#) a pH of 2.5. Dilute with [water](#) to 100 mL.
Solution A: Mix 50 mL of *Buffer*, 750 mL of [water](#), and 200 mL of [methanol](#). Add 5 mL of [triethylamine](#). Mix and adjust with [phosphoric acid](#) to a pH of 2.5.
Solution B: Mix 1 L of [methanol](#) with 50 mL of [phosphoric acid](#).
Mobile phase: See [Table 2](#).

Table 2

Time (min)	Solution A (%)	Solution B (%)
0	55	45
3.0	5	95
3.2	55	45
5.0	55	45

Diluent: 1% (v/v) [hydrochloric acid](#) in [methanol](#)
System suitability solution: 0.04 mg/mL of [USP Benzalkonium Chloride RS](#)▲ (IRA 1-Mar-2021) prepared as follows. Transfer a suitable volume of [USP Benzalkonium Chloride RS](#) to a suitable volumetric flask and ▲add 30% of the flask volume of [water](#). Dilute with *Diluent* to volume.▲ (IRA 1-Mar-2021)
Standard stock solution: 0.2 mg/mL of [USP Benzalkonium Bromide RS](#) in [water](#). [NOTE—A few drops of [methanol](#) may be used to resolve the formation of foam prior to dilution.]
Standard solution: 0.04 mg/mL of [USP Benzalkonium Bromide RS](#). Transfer an aliquot of *Standard stock solution* to a suitable volumetric flask, and add [water](#) equal to 30% of the flask volume. Dilute with *Diluent* to volume.
Sample solution: Combine the contents of NLT 5 units of Nasal Spray and mix the contents to obtain a composite suspension. Transfer a 5.0-g portion of the Nasal Spray to a 10-mL volumetric flask. Dilute with *Diluent* to volume. Centrifuge and use the supernatant. [NOTE—Centrifuging at 4000 rpm for 15 min may be suitable. The supernatant may be passed through a suitable filter of NMT 0.2 µm pore size.]