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Tobramycin for Injection

DEFINITION

Tobramycin for Injection contains an amount of Tobramycin Sulfate equivalent to NLT 90.0% and NMT 115.0% of the labeled amount of tobramycin ($C_{18}H_{37}N_5O_9$).

IDENTIFICATION

- **A. THIN-LAYER CHROMATOGRAPHY**

Diluent: Butyl alcohol and pyridine (100:1)

Standard solution: 6 mg/mL of [USP Tobramycin RS](#)

Sample solution: 6 mg/mL in water, from Tobramycin for Injection diluted with water

Solution A: Standard solution and Sample solution (1:1)

Chromatographic system

(See [Chromatography \(621\), Thin-Layer Chromatography](#).)

Adsorbent: 0.25-mm layer of chromatographic silica gel mixture

Application volume: 3 μ L

Developing solvent system: Methanol, chloroform, and ammonium hydroxide (60:25:30)

Spray reagent: 10 mg/mL of ninhydrin in Diluent

Analysis

Samples: Standard solution, Sample solution, and Solution A

Apply the Standard solution, the Sample solution, and Solution A to the plate. Place the plate in a suitable chromatographic chamber, and develop the chromatogram in the Developing solvent system until the solvent front has moved about three-fourths of the length of the plate. Remove the plate from the chamber, allow the solvent to evaporate, and heat the plate at 110° for 15 min. Immediately locate the spots on the plate by spraying it with Spray reagent.

Acceptance criteria: Tobramycin appears as a pink spot, and the R_F values of the spots of the Sample solution and of Solution A, respectively, correspond to those of the Standard solution.

- **B.** The retention time of the major peak of Derivatized sample solution 1 or Derivatized sample solution 2 corresponds to that of the Derivatized standard solution, obtained as directed in the Assay.

- **C.** [IDENTIFICATION TESTS—GENERAL, Sulfate\(191\)](#): Meets the requirements

ASSAY

- **PROCEDURE**

Mobile phase: Dissolve 2.0 g of tris(hydroxymethyl)aminomethane in 800 mL of water. Add 20 mL of 1 N sulfuric acid, and dilute with acetonitrile to obtain 2000 mL of solution. Cool, and pass through a filter of 0.2- μ m or finer pore size.

Solution A: 10 mg/mL of 2,4-dinitrofluorobenzene in alcohol. This solution may be used for 5 days if refrigerated when not in use.

Solution B: 15 mg/mL of tris(hydroxymethyl)aminomethane in water. This solution may be used for 1 month if refrigerated when not in use.

Solution C: 3 mg/mL of tris(hydroxymethyl)aminomethane prepared as follows. Transfer 40 mL of Solution B to a 200-mL volumetric flask.

Add dimethyl sulfoxide while mixing, and dilute with dimethyl sulfoxide to volume. Use this reagent within 4 h. If kept immersed in an ice-water bath below 10°, the reagent may be used for up to 8 h.

Standard stock solution: 1.1 mg/mL of [USP Tobramycin RS](#) prepared as follows. Transfer 55 mg of [USP Tobramycin RS](#) to a 50-mL volumetric flask. Add 1 mL of 1 N sulfuric acid and enough water to dissolve it, and dilute with water to volume.

Standard solution: 0.22 mg/mL of [USP Tobramycin RS](#) from Standard stock solution in water

Sample solution 1 (where it is represented as being in a single-dose container): Nominally 0.2 mg/mL of tobramycin prepared as follows. Constitute a container of Tobramycin for Injection in a volume of water corresponding to the volume of diluent specified in the labeling. Withdraw all of the withdrawable contents using a suitable hypodermic needle and syringe, and dilute with water.

Sample solution 2 (where the label states the quantity of tobramycin in a given volume of constituted solution): Nominally 0.2 mg/mL of tobramycin prepared as follows. Constitute a container of Tobramycin for Injection in a volume of water equivalent to the volume

of diluent specified in the labeling. Dilute a suitable aliquot of the constituted solution with water to an appropriate volume.

Derivatized standard solution, Derivatized sample solution 1 or Derivatized sample solution 2, and Blank solution: Proceed as follows.

Heat all solutions at the same temperature and for the same duration of time as indicated. Move all flasks to and from the 60° constant temperature bath at the same time.

To separate 50-mL volumetric flasks transfer 4.0 mL of the *Standard solution*, 4.0 mL of *Sample solution 1* or *Sample solution 2*, and 4.0 mL of water. To each flask add 10 mL of *Solution A* and 10 mL of *Solution C*, shake, and insert the stopper. Place the flasks in a constant temperature bath at 60 ± 2°, and heat for 50 ± 5 min. Remove the flasks from the bath, and allow to stand for 10 min. Add acetonitrile to about 2 mL below the 50-mL mark, allow to cool to room temperature, then dilute with acetonitrile to volume. The solutions thus obtained are the *Derivatized standard solution*, *Derivatized sample solution 1* or *Derivatized sample solution 2*, and the *Blank solution*, respectively.

System suitability stock solution: 0.24 mg/mL of *p*-naphtholbenzein in acetonitrile. Prepare freshly.

System suitability solution: Transfer 2 mL of the *System suitability stock solution* to a 10-mL volumetric flask, dilute with the *Derivatized standard solution* to volume, and use promptly.

Chromatographic system

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

Mode: LC

Detector: UV 365 nm

Column: 3.9-mm × 30-cm; packing L1

Flow rate: 1.2 mL/min

Injection volume: 20 µL

System suitability

Samples: *Derivatized standard solution* and *System suitability solution*

[**NOTE**—The relative retention times for *p*-naphtholbenzein and tobramycin are about 0.6 and 1.0, respectively.]

Suitability requirements

Resolution: NLT 4.0 between *p*-naphtholbenzein and tobramycin, *System suitability solution*

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

Analysis

Samples: *Derivatized standard solution*, *Derivatized sample solution 1* or *Derivatized sample solution 2*, and *Blank solution*

Use the *Blank solution* to identify the solvent and reagent peaks.

Calculate the percentage of the labeled amount of tobramycin ($C_{18}H_{37}N_5O_9$) in the portion of *Tobramycin for Injection* taken:

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

r_U = peak area of tobramycin from *Derivatized sample solution 1* or *Derivatized sample solution 2*

r_S = peak area of tobramycin from the *Derivatized standard solution*

C_S = concentration of [USP Tobramycin RS](#) in the *Standard solution* (mg/mL)

C_U = nominal concentration of tobramycin in *Sample solution 1* or *Sample solution 2* (mg/mL)

P = potency of tobramycin in [USP Tobramycin RS](#) (µg/mg)

F = conversion factor, 0.001 mg/µg

Acceptance criteria: 90.0%–115.0%

PERFORMANCE TESTS

- [UNIFORMITY OF DOSAGE UNITS \(905\)](#): Meets the requirements

IMPURITIES

- [RESIDUE ON IGNITION \(281\)](#).

Analysis: Moisten the charred residue with 2 mL of nitric acid and 5 drops of sulfuric acid.

Acceptance criteria: NMT 1.0%

SPECIFIC TESTS

- [INJECTIONS AND IMPLANTED DRUG PRODUCTS \(1\), Specific Tests, Completeness and clarity of solutions](#): At the time of use, it meets the requirements.
- [BACTERIAL ENDOTOXINS TEST \(85\)](#): It contains NMT 2.00 USP Endotoxin Units/mg of tobramycin.
- [STERILITY TESTS \(71\)](#): It meets the requirements in [Test for Sterility of the Product to Be Examined, Membrane Filtration](#), 6 g being used if it is not packaged for dispensing.

• [pH \(791\)](#)

Sample solution: 40 mg/mL or where packaged for dispensing, use the solution constituted as directed in the labeling.

Acceptance criteria: 6.0–8.0

• [WATER DETERMINATION, Method I \(921\)](#): NMT 2.0%**• [PARTICULATE MATTER IN INJECTIONS \(788\)](#):** Meets the requirements for small-volume injections**• OTHER REQUIREMENTS:** It meets the requirements in [Labeling \(7\), Labels and Labeling for Injectable Products](#).**ADDITIONAL REQUIREMENTS****• [PACKAGING AND STORAGE:](#)** Preserve as described in [Packaging and Storage Requirements \(659\), Injection Packaging, Packaging for constitution](#).**• [USP REFERENCE STANDARDS \(11\)](#):**

[USP Tobramycin RS](#)

Auxiliary Information - Please [check for your question in the FAQs](#) before contacting USP.

Topic/Question	Contact	Expert Committee
TOBRAMYCIN FOR INJECTION	Documentary Standards Support	SM12020 Small Molecules 1
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM12020 Small Molecules 1

Chromatographic Database Information: [Chromatographic Database](#)

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