

Levetiracetam Injection

DEFINITION

Levetiracetam Injection is a sterile solution of levetiracetam in Water for Injection and contains NLT 90.0% and NMT 110.0% of the labeled amount of levetiracetam (C₈H₁₄N₂O₂). Levetiracetam Injection may contain buffering and isotonicity agents. Levetiracetam Injection contains no antimicrobial agent.

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*.

ASSAY

PROCEDURE

Buffer: 1.0 g/L of anhydrous dibasic potassium phosphate in water. Adjust with phosphoric acid to a pH of 6.0.
Mobile phase: Acetonitrile and *Buffer* (6:94)
Diluent: Acetonitrile and water (6:94)
System suitability solution: Solution containing levetiracetam and levetiracetam acid prepared from a solution of 0.2 mg/mL of USP Levetiracetam RS as follows. Dissolve the required amount of USP Levetiracetam RS in 10% of the final volume of 0.1 N potassium hydroxide. Let the mixture react at room temperature for about 15 min, then neutralize by adding 10% of the flask volume of 0.1 N hydrochloric acid. Dilute with *Diluent* to volume.
Standard solution: 100 µg/mL of USP Levetiracetam RS in *Diluent*. Sonication may be used to aid in dissolution if necessary.
Sample solution: Nominally 100 µg/mL of levetiracetam from NLT 2 mL of Injection in *Diluent*

Chromatographic system

(See *Chromatography* <621>, *System Suitability*.)
Mode: LC
Detector: UV 205 nm
Column: 3.9-mm × 30-cm; 10-µm packing L1
Flow rate: 1 mL/min
Injection volume: 20 µL
Run time: NLT 1.5 times the retention time of levetiracetam

System suitability

Samples: *System suitability solution* and *Standard solution*
[NOTE—Identify the peaks using the relative retention times given in *Table 1*.]
Suitability requirements
Tailing factor: NMT 2.0 for the levetiracetam peak, *System suitability solution*
Relative standard deviation: NMT 1.5%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*
Calculate the percentage of the labeled amount of levetiracetam (C₈H₁₄N₂O₂) in the portion of Injection taken:

Result = (r_U/r_S) × (C_S/C_U) × 100

- r_U = peak response of levetiracetam from the *Sample solution*
- r_S = peak response of levetiracetam from the *Standard solution*
- C_S = concentration of USP Levetiracetam RS in the *Standard solution* (µg/mL)
- C_U = nominal concentration of levetiracetam in the *Sample solution* (µg/mL)

Acceptance criteria: 90.0%–110.0%

IMPURITIES

ORGANIC IMPURITIES

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

Standard solution: 0.1 µg/mL of USP Levetiracetam RS in *Diluent*

System suitability

Samples: *System suitability solution* and *Standard solution*
[NOTE—Identify the peaks using the relative retention times in *Table 1*.]

Suitability requirements

Tailing factor: NMT 2.0 for the levetiracetam peak, *System suitability solution*
Relative standard deviation: NMT 10.0%, *Standard solution*
Signal-to-noise ratio: NLT 10, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*
Calculate the percentage of levetiracetam acid and any other unspecified degradation product in the portion of Injection taken:

Result = (r_U/r_S) × (C_S/C_U) × 100

- r_U = peak response of levetiracetam acid or any individual unspecified degradation product from the *Sample solution*
- r_S = peak response of levetiracetam from the *Standard solution*
- C_S = concentration of USP Levetiracetam RS in the *Standard solution* (µg/mL)
- C_U = nominal concentration of levetiracetam in the *Sample solution* (µg/mL)

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Levetiracetam acid ^a	0.4	0.3
Levetiracetam	1.0	—
Any individual unspecified degradation product	—	0.10
Total impurities	—	1.00

^a (S)-2-(2-Oxopyrrolidin-1-yl)butanoic acid.

SPECIFIC TESTS

- pH** <791>: 5.0–6.0
- BACTERIAL ENDOTOXINS TEST** <85>: Contains NMT 0.175 USP Endotoxin Units/mg of levetiracetam
- STERILITY TESTS** <71>: Meets the requirements when tested as directed for *Aqueous Solutions* under *Test for Sterility of the Product to Be Examined, Membrane Filtration*
- PARTICULATE MATTER IN INJECTIONS** <788>: Meets the requirements for small-volume injections

ADDITIONAL REQUIREMENTS

- PACKAGING AND STORAGE:** Preserve in well-closed Type I glass vials. Store at controlled room temperature.
- LABELING:** Label the article to indicate that the Injection is to be diluted prior to administration.
- USP REFERENCE STANDARDS** <11>
USP Levetiracetam RS