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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 ($C_8H_{14}N_2O_2$). 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 ($C_8H_{14}N_2O_2$) in the portion of Injection taken:

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

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:

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

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

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

Topic/Question	Contact	Expert Committee
LEVETIRACETAM INJECTION	Documentary Standards Support	SM42020 Small Molecules 4
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM42020 Small Molecules 4

Chromatographic Database Information: Chromatographic Database

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