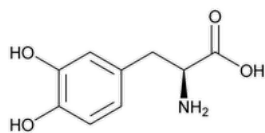


Status: Currently Official on 15-Feb-2025
 Official Date: Official as of 01-May-2020
 Document Type: USP Monographs
 DocId: GUID-7A8037B2-65FA-47D0-B76F-E9F66BA79308_5_en-US
 DOI: https://doi.org/10.31003/USPNF_M44720_05_01
 DOI Ref: zy370

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Levodopa



$C_9H_{11}NO_4$ 197.19

L-Tyrosine, 3-hydroxy-;

(-)-3-(3,4-Dihydroxyphenyl)-L-alanine CAS RN®: 59-92-7; UNII: 466270600J.

DEFINITION

Levodopa contains NLT 98.0% and NMT 102.0% of levodopa ($C_9H_{11}NO_4$), calculated on the dried basis.

IDENTIFICATION

Change to read:

- **A.** ▲ [SPECTROSCOPIC IDENTIFICATION TESTS \(197\)](#), [Infrared Spectroscopy: 197M](#) ▲ (CN 1-MAY-2020)
- **B.** 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

Protect all solutions from light, and maintain them at 10° until they are injected into the chromatograph.

Diluent: 0.1% trifluoroacetic acid in water

Mobile phase: Tetrahydrofuran and *Diluent* (3:97)

System suitability solution: 10 µg/mL each of [USP Levodopa RS](#), [USP Levodopa Related Compound B RS](#), and [USP L-Tyrosine RS](#) in *Diluent*

Standard solution: 0.4 mg/mL of [USP Levodopa RS](#) in *Diluent*

Sample solution: 0.4 mg/mL of Levodopa in *Diluent*

Chromatographic system

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

Mode: LC

Detector: UV 280 nm

Column: 4.6-mm × 25-cm; 5-µm L1 packing

Flow rate: 1 mL/min

Injection volume: 20 µL

System suitability

Sample: *System suitability solution*

[NOTE—Refer to [Table 1](#) in the test for *Organic Impurities* for the relative retention times.]

Suitability requirements

Resolution: NLT 3.0 between levodopa and L-tyrosine

Tailing factor: NMT 2.0 for levodopa

Relative standard deviation: NMT 2.0% for levodopa

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of levodopa ($C_9H_{11}NO_4$) in the portion of the sample taken:

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

r_U = peak response of the *Sample solution*

r_S = peak response of the *Standard solution*

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

C_U = concentration of Levodopa in the *Sample solution* (mg/mL)

Acceptance criteria: 98.0%–102.0% on the dried basis

IMPURITIES

- **RESIDUE ON IGNITION (281):** NMT 0.1%

Change to read:

- **ORGANIC IMPURITIES**

Protect all solutions from light, and maintain them at 10° until they are injected into the chromatograph.

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

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of each impurity in the portion of Levodopa taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (1/F) \times 100$$

r_U = peak area for any impurity in the *Sample solution*

r_S = peak area for Levodopa in the *Standard solution*

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

C_U = concentration of Levodopa in the *Sample solution* (mg/mL)

F = relative response factor of each impurity (see [Table 1](#))

Acceptance criteria: See [Table 1](#).

Table 1

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Levodopa related compound A ^a	0.9	0.41	0.1
Levodopa	1.0	—	—
L-Tyrosine	1.3	0.44	0.1
Levodopa related compound B	1.6	0.83	0.5
L-Veratrylglycine ^b	2.7	0.76	0.1
Individual unknown impurity	—	1.0	0.1
Total impurities	—	—	1.1

^a 3-(3,4,6-Trihydroxyphenyl)alanine[▲]; also known as 3-(2,4,5-Trihydroxyphenyl)-L-alanine. [▲] (ERR 1-Nov-2018)

^b 3-(3,4-Dimethoxyphenyl)-L-alanine.

SPECIFIC TESTS

- **OPTICAL ROTATION, Specific Rotation (781S).**

Sample solution: 500 mg of Levodopa in a 25-mL volumetric flask. Add 10 mL of 1 N hydrochloric acid to dissolve the solid, add 5 g of methenamine, swirl the contents to dissolve the methenamine, and add 1 N hydrochloric acid to volume.

Analysis: Allow the *Sample solution* to stand in the dark at 25° for 3 h, and measure the rotation.

Acceptance criteria: –160° to –167°

- **LOSS ON DRYING (731).**

Analysis: Dry at 105° for 4 h.

Acceptance criteria: NMT 0.5%

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight, light-resistant containers, store in a dry place, and prevent exposure to excessive heat.

- **USP REFERENCE STANDARDS (11).**

[USP Levodopa RS](#)

[USP Levodopa Related Compound B RS](#)

3-Methoxytyrosine.