Levocarnitine Tablets

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Expert Committee	Non-Botanical Dietary Supplements

In accordance with the Rules and Procedures of the Council of Experts, the Non-Botanical Dietary Supplements Expert Committee has revised the Levocarnitine Tablets monograph. The purpose of this revision is to add *Dissolution Test 2* to accommodate FDA-approved drug products with different dissolution conditions and/or tolerances than the existing dissolution test(s).

- *Dissolution Test 2* was validated using the Waters XBridge brand of column with L7 packing. The typical retention time for levocarnitine is about 1.6 min.

The Levocarnitine Tablets Revision Bulletin supersedes the currently official monograph.

Should you have any questions, please contact Natalia Davydova, Principal Scientist (301-816-8328 or nd@usp.org).

Revision Bulletin
Official: August 1, 2024

Levocarnitine Tablets

DEFINITION
Levocarnitine Tablets contain NLT 90.0% and NMT 110.0% of the labeled amount of levocarnitine ($C_7H_{15}NO_3$).

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. Color Reaction**

Analysis: Dissolve 1 Tablet in 5 mL of water, filter, and add 5 mL of 1 N hydrochloric acid. Place 2 mL of the filtrate in a test tube, and add a few drops of ammonium reineckate TS.

Acceptance criteria: A red-violet precipitate is produced.

ASSAY
• **Procedure**

Buffer: 0.05 M phosphate buffer, pH 4.5, prepared by dissolving 6.805 g of monobasic potassium phosphate in 1 L of water

Mobile phase: Acetonitrile and *Buffer* (65:35). Adjust with phosphoric acid to a pH of 4.7, and mix.

System suitability solution: 1.5 mg/mL of USP Levocarnitine RS and 7 µg/mL of USP Levocarnitine Related Compound A RS in water

Standard solution: 3 mg/mL of USP Levocarnitine RS in water

Sample solution: Transfer 10 Tablets, accurately weighed, to a 500-mL volumetric flask, and add water to volume. Shake until the Tablets have disintegrated completely, and pass through a filter of 0.45-µm pore size. Dilute a portion of the filtrate quantitatively with water to a nominal concentration of about 3 mg/mL of levocarnitine.

Chromatographic system

(See *Chromatography* ⟨621⟩, *System Suitability*.)

Mode: LC

Detector: UV 205 nm

Column: 3.9-mm × 30-cm; 10-µm packing L8

Flow rate: 1 mL/min

Injection volume: 20 µL

System suitability

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

Suitability requirements

Resolution: NLT 1.0 between levocarnitine related compound A (crotonoylbetaine) and levocarnitine, *System suitability solution*

Relative standard deviation: NMT 2.0% for levocarnitine, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of levocarnitine ($C_7H_{15}NO_3$) in the portion of Tablets taken:

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

r_U = peak area of levocarnitine from the *Sample solution*

r_S = peak area of levocarnitine from the *Standard solution*

C_S = concentration of USP Levocarnitine RS in the *Standard solution* (mg/mL)

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

Acceptance criteria: 90.0%–110.0%

PERFORMANCE TESTS
Change to read:

- **Dissolution** ⟨711⟩

▲Test 1▲ (RB 1-Aug-2024)

Medium: Water; 900 mL

Apparatus 2: 75 rpm

Time: 30 min

Standard solution: Known concentration of USP Levocarnitine RS in *Medium*

Sample solution: Filtered portion of the solution under test, suitably diluted with *Medium* if necessary

Analysis

Samples: *Standard solution* and *Sample solution*

Proceed as directed in the *Assay*, making any necessary modifications.

Determine the percentage of the labeled amount of levocarnitine ($C_7H_{15}NO_3$) dissolved:

$$\text{Result} = (r_U/r_S) \times (C_S \times D \times V/L) \times 100$$

r_U = peak area of levocarnitine in the *Sample solution*

r_S = peak area of levocarnitine in the *Standard solution*

C_S = concentration of USP Levocarnitine RS in the *Standard solution* (mg/mL)

D = dilution factor for the *Sample solution*

V = volume of *Medium*, 900 mL

L = label claim (mg/Tablet)

Tolerances: NLT 75% (Q) of the labeled amount of levocarnitine ($C_7H_{15}NO_3$) is dissolved.

▲Test 2: If the product complies with this test, the labeling indicates that it meets USP *Dissolution Test 2*.

Medium: 0.1 N hydrochloric acid; 500 mL

Apparatus 1: 100 rpm

Time: 30 min

Solution A: 300 mL of acetonitrile, 700 mL of water, and 1 mL of phosphoric acid

Solution B: Dilute phosphoric acid with water (1:10).

Mobile phase: Sonicate 2.88 g of sodium lauryl sulfate and 2.3 g of monobasic ammonium phosphate in *Solution A* until dissolved. Adjust with *Solution B* to a pH of 2.4.

Standard solution: 0.66 mg/mL of USP Levocarnitine RS in *Medium*

Sample solution: Pass a portion of the solution under test through a 0.45-µm Nylon filter, discarding the first 4 mL of filtrate.

Chromatographic system

(See *Chromatography* ⟨621⟩*, System Suitability*.)

Mode: LC

Detector: UV 205 nm

Column: 4.6-mm × 7.5-cm; 3.5-µm packing L7

Column temperature: 35°

Flow rate: 1.5 mL/min

Injection volume: 100 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 2.0

Relative standard deviation: NMT 3.0% from 6 replicate injections

Analysis

Samples: *Standard solution* and *Sample solution*

Determine the percentage of the labeled amount of levocarnitine ($C_7H_{15}NO_3$) dissolved:

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

r_U = peak area of levocarnitine in the *Sample solution*

r_S = peak area of levocarnitine in the *Standard solution*

C_S = concentration of USP Levocarnitine RS in the *Standard solution* (mg/mL)

V = volume of *Medium*, 500 mL

L = label claim (mg/Tablet)

Tolerances: NLT 80% (Q) of the labeled amount of levocarnitine ($C_7H_{15}NO_3$) is dissolved. ▲ (RB 1-Aug-2024)

- **Uniformity of Dosage Units** ⟨905⟩**:** Meet the requirements for *Weight Variation*

ADDITIONAL REQUIREMENTS

- **Packaging and Storage:** Preserve in tight containers.
- **USP Reference Standards** ⟨11⟩

USP Levocarnitine RS

USP Levocarnitine Related Compound A RS

2-Propen-1-aminium, 3-carboxy-*N*,*N*,*N*-trimethyl-, chloride.

$C_7H_{14}ClNO_2$ 179.65

Levocarnitine Tablets —*see* Levocarnitine Tablets General Monographs

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