Cetirizine Hydrochloride Tablets

DEFINITION

Cetirizine Hydrochloride Tablets contain NLT 90.0% and NMT 110.0% of cetirizine hydrochloride ($C_{21}H_{25}ClN_2O_3 \cdot 2HCl$).

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**

Solution A: 2 N sulfuric acid and water (2:33)
Buffer: 2.9 mL/L of phosphoric acid in water
Mobile phase: Acetonitrile and *Buffer* (3:7)
Diluent: Acetonitrile, *Solution A*, and water (100:1:100)
Standard solution: 0.2 mg/mL of USP Cetirizine Hydrochloride RS in *Diluent*
Sample solution: 0.2 mg/mL of cetirizine hydrochloride in *Diluent* from NLT 20 powdered Tablets. [NOTE—Sonicate, if necessary.]
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 230 nm
Column: 4.6-mm × 25-cm; 5-µm packing L1
Flow rate: 1.5 mL/min
Injection volume: 10 µL
Run time: 1.3 times the retention time of cetirizine
System suitability
Sample: *Standard solution*
Suitability requirements
Tailing factor: NMT 2.0
Relative standard deviation: NMT 2.0%
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the percentage of the labeled amount of cetirizine hydrochloride ($C_{21}H_{25}ClN_2O_3 \cdot 2HCl$) in the portion of Tablets taken:

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

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of USP Cetirizine Hydrochloride RS in the *Standard solution* (mg/mL)
C_U = nominal concentration of cetirizine hydrochloride in the *Sample solution* (mg/mL)

Acceptance criteria: 90.0%–110.0%

PERFORMANCE TESTS

Change to read:

• **DISSOLUTION** ⟨**711**⟩

•**Test 1**• (RB 1-Aug-2012)
Medium: Water; 900 mL, degassed
Apparatus 2: 50 rpm
Time: 30 min
Buffer: 2.9 mL/L of phosphoric acid in water
Mobile phase: Acetonitrile and *Buffer* (2:3)
Standard solution: 11 µg/mL of USP Cetirizine Hydrochloride RS in water. This solution can be stored for 48 h at room temperature.
Sample solution: Pass a portion of the solution under test through a suitable filter of 0.45-µm pore size.
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 230 nm
Column: 4.6-mm × 25-cm; 5-µm packing L1
Flow rate: 1 mL/min
Injection volume: 50 µL
Run time: 1.3 times the retention time of cetirizine
System suitability
Sample: *Standard solution*
Suitability requirements
Tailing factor: NMT 2.0
Relative standard deviation: NMT 2.0%
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the percentage of the labeled amount of cetirizine hydrochloride ($C_{21}H_{25}ClN_2O_3 \cdot 2HCl$) dissolved:

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

r_U = peak response from the •*Sample solution*• (RB 1-Aug-2012)
r_S = peak response from the •*Standard solution*• (RB 1-Aug-2012)
C_S = concentration of the *Standard solution* (mg/mL)
L = label claim (mg/Tablet)
V = volume of *Medium,* 900 mL

Tolerances: NLT 80% (*Q*) of the labeled amount of cetirizine hydrochloride ($C_{21}H_{25}ClN_2O_3 \cdot 2HCl$) is dissolved.

•**Test 2:** If the product complies with this test, the labeling indicates that it meets USP *Dissolution Test 2*.
Medium: Water; 900 mL
Apparatus 2: 75 rpm
Time: 30 min
Buffer: 0.4 g/L of 1-heptane sulfonic acid sodium salt
Mobile phase: Acetonitrile and *Buffer* (50:50). Adjust with 0.1 N sulfuric acid to a pH of 3.5.
Standard solution: 11 µg/mL of USP Cetirizine Hydrochloride RS in *Medium*
Sample solution: Pass a 20-mL portion of the solution under test through a nylon filter of 0.45-µm pore size. Discard the first 10 mL of the filtrate.
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 210 nm
Column: 3.9-mm × 30-cm; 10-µm packing L1
Flow rate: 1.5 mL/min
Injection volume: 50 µL
Run time: 1.6 times the retention time of cetirizine
System suitability
Sample: *Standard solution*
Suitability requirements
Tailing factor: NMT 2.0
Relative standard deviation: NMT 2.0%
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the percentage of the labeled amount of cetirizine hydrochloride ($C_{21}H_{25}ClN_2O_3 \cdot 2HCl$) dissolved:

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

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of USP Cetirizine Hydrochloride RS in the *Standard solution* (mg/mL)
L = label claim (mg/Tablet)
V = volume of *Medium,* 900 mL

Tolerances: NLT 80% (*Q*) of the labeled amount of cetirizine hydrochloride ($C_{21}H_{25}ClN_2O_3 \cdot 2HCl$) is dissolved.

Test 3: If the product complies with this test, the labeling indicates that it meets USP *Dissolution Test 3*.
Medium: Water; 900 mL
Apparatus 2: 50 rpm
Time: 30 min
Standard solution: (*L*/900) mg/mL of USP Cetirizine Hydrochloride RS in water, where *L* is the label claim of cetirizine hydrochloride, in mg/Tablet
Sample solution: Centrifuge a portion of the solution under test for NLT 15 min at 3000 rpm.
Instrumental conditions
(See *Spectrophotometry and Light-Scattering* ⟨851⟩.)
Mode: UV
Analytical wavelength: UV 231 nm
Blank: *Medium*
Path length: 1 cm
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the percentage of the labeled amount of cetirizine hydrochloride ($C_{21}H_{25}ClN_2O_3 \cdot 2HCl$) dissolved:

$$\text{Result} = (A_U/A_S) \times (C_S/L) \times V \times 100$$

A_U = absorbance of the *Sample solution*
A_S = absorbance of the *Standard solution*
C_S = concentration of USP Cetirizine Hydrochloride RS in the *Standard solution* (mg/mL)
L = label claim (mg/Tablet)
V = volume of *Medium*, 900 mL

Tolerances: NLT 80% (*Q*) of the labeled amount of cetirizine hydrochloride ($C_{21}H_{25}ClN_2O_3 \cdot 2HCl$) is dissolved.● (RB 1-Aug-2012)

- **UNIFORMITY OF DOSAGE UNITS ⟨905⟩:** Meet the requirements

IMPURITIES

Change to read:

- **ORGANIC IMPURITIES**
Solution A: 2 N sulfuric acid and water (2:33)
Buffer: 3.4 g/L of tetrabutyl ammonium hydrogen sulfate in water
Diluent: Acetonitrile, *Solution A*, and water (910:27:63)
Mobile phase: Acetonitrile, *Solution A*, and *Buffer* (93:5:2)
Standard solution: 1.5 µg/mL of USP Cetirizine Hydrochloride RS in *Diluent*
Sample solution: 0.5 mg/mL of cetirizine hydrochloride in *Diluent* from NLT 20 powdered Tablets. [NOTE—Sonicate, if necessary.]
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 230 nm
Column: 4.0-mm × 25-cm; 5-µm packing L3
Flow rate: 0.8 mL/min
Injection volume: 20 µL
Run time: 2.5 times the retention time of cetirizine
System suitability
Sample: *Standard solution*
Suitability requirements
Tailing factor: NMT 2.0
Relative standard deviation: NMT 10.0%
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the percentage of each impurity in the portion of Tablets taken:

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

r_U = peak response of each impurity from the *Sample solution*
r_S = peak response of cetirizine from the *Standard solution*
C_S = concentration of USP Cetirizine Hydrochloride RS in the *Standard solution* (mg/mL)
C_U = nominal concentration of cetirizine hydrochloride in the *Sample solution* (mg/mL)
F = relative response factor (see *Table 1*)

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Cetirizine lactose ester[a]	0.56	1.0	●0.5● (RB 1-Feb-2013)
Cetirizine	1.0	—	—
Cetirizine ethanol[b]	1.67	1.2	●0.2● (RB 1-Aug-2012)
Any unspecified degradation product	—	—	0.2
Total impurities	—	—	●1● (RB 1-Feb-2013)

[a] 6-*O*-[2-(2-{4-[(4-Chlorophenyl)(phenyl)methyl]piperazin-1-yl}-ethoxy)acetyl]-β-D-galactopyranosyl-(1→4)β-D-glucopyranose.
[b] 2-[4-[(4-Chlorophenyl)phenylmethyl]piperazin-1-yl]ethanol.

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in well-closed containers, and store below 30°.

Add the following:

●• **LABELING:** When more than one *Dissolution* test is given, the labeling states the *Dissolution* test used only if *Test 1* is not used.● (RB 1-Aug-2012)

- **USP REFERENCE STANDARDS ⟨11⟩**
USP Cetirizine Hydrochloride RS