Status: Currently Official on 14-Feb-2025
Official Date: Official Prior to 2013
Document Type: USP Monographs
DocId: GUID-DA6A33CD-2BA2-48C6-B7B1-3025A5A65E57_1_en-US
DOI: https://doi.org/10.31003/USPNF_M2944_01_01
DOI Ref: g2a9c

Cetirizine Hydrochloride Oral Solution

DEFINITION
Cetirizine Hydrochloride Oral Solution contains NLT 90.0% and NMT 110.0% of the labeled amount of $C_{21}H_{25}ClN_2O_3 \cdot 2HCl$.

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*.
- **B.** **Identification Tests—General, *Chloride*⟨191⟩:** Meets the requirements

ASSAY

- **Procedure**

Solution A: Acetonitrile

Solution B: 1.36 g/L of monobasic potassium phosphate in water. Adjust with a 2% solution of phosphoric acid in water to a pH of 3.5 ± 0.05.

Diluent: Acetonitrile and water (3:7)

Mobile phase: See the gradient table below.

Time (min)	*Solution A* (%)	*Solution B* (%)
0	5	95
15	5	95
22	25	75
35	25	75
40	5	95
50	5	95

Standard stock solution: 5 mg/mL of USP Cetirizine Hydrochloride RS in water

Standard solution: 0.1 mg/mL of USP Cetirizine Hydrochloride RS in *Diluent*, from the *Standard stock solution*

Sample solution: Transfer an amount of Oral Solution to a suitable volumetric flask to obtain a nominal concentration of 0.1 mg/mL of cetirizine hydrochloride. Dissolve in 60% of the flask volume of *Diluent* by swirling. Sonicate 3 min, and dilute with *Diluent* to volume. Pass through a suitable filter.

Chromatographic system

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

Mode: LC

Detector: UV 233 nm

Column: 4.6-mm × 25-cm; 5-µm packing L10

Column temperature: 50°

Flow rate: 2 mL/min

Injection size: 20 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 1.5

Relative standard deviation: NMT 1.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of $C_{21}H_{25}ClN_2O_3 \cdot 2HCl$ in the portion of Oral Solution 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

• **Deliverable Volume ⟨698⟩:** Meets the requirements

IMPURITIES

Organic Impurities

• **Procedure**

Solution A: Transfer 50 mL of water to a 100-mL volumetric flask, add 5.5 mL of sulfuric acid, and dilute with water to volume.

Mobile phase: Acetonitrile, water, and *Solution A* (965:33:1)

Diluent: Acetonitrile and water (7:13)

Standard solution: 6 µg/mL of USP Cetirizine Hydrochloride RS in *Diluent*

Sample solution: 0.6 mg/mL of cetirizine hydrochloride in *Diluent*. Transfer an amount of Oral Solution to a suitable volumetric flask, dissolve in *Diluent*, sonicate for 10 min, and dilute with *Diluent* to volume. Pass through a suitable filter.

Chromatographic system

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

Mode: LC

Detector: UV 230 nm

Column: 4.6-mm × 25-cm; 5-µm packing L3

Column temperature: 30°

Flow rate: 2 mL/min

Injection size: 10 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Column efficiency: NLT 10,000 theoretical plates

Tailing factor: NMT 1.5

Relative standard deviation: NMT 5.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of each impurity in the portion of Oral Solution taken:

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

r_U = peak response for each impurity from the *Sample solution*

r_S = peak response for 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)

Acceptance criteria: See *Impurity Table 1*.

Total impurities: NMT 0.8%

Impurity Table 1

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Cetirizine acetic acid[a]	0.69	P[b]
2-Chlorocetirizine[c]	0.83	P
Cetirizine	1.00	—

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Cetirizineethanol[d]	1.30	P
Ethoxycetirizine[e]	1.38	P
CBHP[f]	1.52	P
Propylene glycol ester of cetirizine (diastereomer 1)[g]	1.53	0.2
Propylene glycol ester of cetirizine (diastereomer 2)[g]	1.61	0.2
Deschlorocetirizine[h]	1.65	P
Glyceryl ester of cetirizine[i]	2.20	0.5
Any individual unspecified impurity	—	0.2

[a] 2-[4-[(4-Chlorophenyl)phenylmethyl]piperazin-1-yl]acetic acid.

[b] P = Process impurity. Provided for information only; the content is not calculated and not reported. The content is controlled in the drug substance monograph.

[c] 2-[2-[4-[(2-Chlorophenyl)phenylmethyl]piperazin-1-yl]ethoxy]acetic acid.

[d] 2-[4-[(4-Chlorophenyl)phenylmethyl]piperazin-1-yl]ethanol.

[e] 2-[2-[2-[4-[(4-Chlorophenyl)phenylmethyl]piperazin-1-yl]ethoxy] ethoxy]acetic acid (ethoxycetirizine).

[f] 1-[(4-Chlorophenyl)phenylmethyl]piperazine.

[g] 2-Hydroxypropyl 2-(2-{4-[(4-chlorophenyl)phenylmethyl]piperazin-1-yl}ethoxy)acetate.

[h] 2-{2-[4-(Diphenylmethyl)piperazin-1-yl]ethoxy]acetic acid.

[i] 2,3-Dihydroxypropyl 2-(2-{4-[(4-chlorophenyl)phenylmethyl]piperazin-1-yl}ethoxy)acetate.

SPECIFIC TESTS

• **pH ⟨791⟩:** 4.0–5.1

• **Microbial Enumeration Tests ⟨61⟩** and **Tests for Specified Microorganisms ⟨62⟩:** The total aerobic microbial count does not exceed 100 cfu/mL, and the total combined molds and yeasts count does not exceed 10 cfu/mL. It meets the requirements of the tests for absence of *Escherichia coli*.

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in well-closed containers, and protect from light. Store at controlled room temperature or in a cold place.

• **USP Reference Standards ⟨11⟩**
USP Cetirizine Hydrochloride RS

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

Topic/Question	Contact	Expert Committee
CETIRIZINE HYDROCHLORIDE ORAL SOLUTION	Documentary Standards Support	SM52020 Small Molecules 5

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. Information currently unavailable

Current DocID: GUID-DA6A33CD-2BA2-48C6-B7B1-3025A5A65E57_1_en-US
DOI: https://doi.org/10.31003/USPNF_M2944_01_01
DOI ref: g2a9c