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Clonidine Hydrochloride Injection

DEFINITION

Clonidine Hydrochloride Injection is a sterile solution of Clonidine Hydrochloride in Water for Injection. It contains NLT 90.0% and NMT 110.0% of the labeled amount of clonidine hydrochloride ($C_9H_9Cl_2N_3 \cdot HCl$).

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.** **Spectroscopic Identification Tests ⟨197⟩, *Ultraviolet-Visible Spectroscopy*: 197U**

Diluent: 9 g/L of sodium chloride in water

Standard solution: 0.1 mg/mL of USP Clonidine Hydrochloride RS in *Diluent*. Sonicate to dissolve, if needed.

Sample solution: Nominally 0.1 mg/mL of clonidine hydrochloride from Injection. Dilute with *Diluent*, if needed.

Acceptance criteria: The UV spectrum of the *Sample solution* exhibits maxima and minima at the same wavelengths as that of the *Standard solution*.

ASSAY

- **Procedure**

Solution A: Dilute 2.0 mL of perchloric acid (70%) in 4000 mL of water.

Solution B: Acetonitrile and methanol (95:5)

Mobile phase: *Solution A* and *Solution B* (85:15)

Diluent: 9 g/L of sodium chloride in water

Standard solution: 0.01 mg/mL of USP Clonidine Hydrochloride RS in *Diluent*. Sonicate to dissolve, if needed.

Sample solution: Nominally 0.01 mg/mL of clonidine hydrochloride from the Injection, diluted with *Diluent*

Chromatographic system

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

Mode: LC

Detector: UV 210 nm

Column: 3.0-mm × 15-cm; 5-µm packing L56

Flow rate: 1.2 mL/min

Injection volume: 25 µL

Run time: NLT 2 times the retention time of clonidine

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 the labeled amount of clonidine hydrochloride ($C_9H_9Cl_2N_3 \cdot HCl$) in the portion of Injection taken:

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

r_U = peak response of clonidine from the *Sample solution*

r_S = peak response of clonidine from the *Standard solution*

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

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

Acceptance criteria: 90.0%–110.0%

IMPURITIES

• **Organic Impurities**

Solution A, Solution B, and **Diluent:** Prepare as directed in the *Assay*.

Mobile phase: See *Table 1*.

Table 1

Time (min)	Solution A (%)	Solution B (%)
0	97	3
35	50	50
50	50	50
51	97	3
60	97	3

Sensitivity solution: 0.05 µg/mL of USP Clonidine Hydrochloride RS in *Diluent*

Standard solution: 0.5 µg/mL of USP Clonidine Hydrochloride RS in *Diluent*. Sonicate to dissolve, if needed.

Sample solution: Nominally 100 µg/mL of clonidine hydrochloride from the Injection. Dilute with *Diluent*, if needed.

Chromatographic system: Proceed as directed in the *Assay*, except for the *Flow rate* and the *Run time*.

Flow rate: 1 mL/min

Run time: 60 min

System suitability

Samples: *Sensitivity solution* and *Standard solution*

Suitability requirements

Relative standard deviation: NMT 10.0%, *Standard solution*

Signal-to-noise ratio: NLT 10, *Sensitivity solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of any unspecified impurity in the portion of Injection taken:

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

r_U = peak response of any unspecified impurity from the *Sample solution*

r_S = peak response of clonidine from the *Standard solution*

C_S = concentration of USP Clonidine Hydrochloride RS in the *Standard solution* (µg/mL)

C_U = nominal concentration of clonidine hydrochloride in the *Sample solution* (µg/mL)

Acceptance criteria: See *Table 2*.

Table 2

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Clonidine	1.0	—

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
N-(2,6-Dichlorophenyl)formamide[a]	1.4	—
2,6-Dichloroaniline[a]	3.0	—
2,6-Dichloroacetanilide[a]	3.5	—
(2,6-Dichlorophenyl)carbonimidic dichloride[a]	5.1	—
Any unspecified impurity	—	0.30
Total impurities	—	0.75

[a] Process impurity for peak identification only; not to be reported or included in the total impurities.

SPECIFIC TESTS

- **pH ⟨791⟩:** 5.0–7.0
- **Particulate Matter in Injections ⟨788⟩:** Meets the requirements for small-volume injections

Change to read:

- **▲Osmolality and Osmolarity ⟨785⟩**

  Osmolality:▲ (Official 1-Aug-2022) 270–330 mOsmol/kg
- **Sterility Tests ⟨71⟩:** Meets the requirements
- **Bacterial Endotoxins Test ⟨85⟩:** Meets the requirements

ADDITIONAL REQUIREMENTS

- **Packaging and Storage:** Preserve in well-closed Type 1 glass vials. Store at controlled room temperature.
- **USP Reference Standards ⟨11⟩**

  USP Clonidine Hydrochloride RS

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

We apologize for the inconvenience. The exact auxiliary information for this Documentary Standard is currently unavailable. Please contact Documentary Standards Support (stdsmonographs@usp.org) for assistance during this time.

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