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Levobunolol Hydrochloride Ophthalmic Solution

DEFINITION

Levobunolol Hydrochloride Ophthalmic Solution contains NLT 90.0% and NMT 110.0% of the labeled amount of levobunolol hydrochloride ($C_{17}H_{25}NO_3 \cdot HCl$).

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*.

Add the following:

▲• **B.** The UV spectrum of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.▲ (USP 1-Dec-2019)

ASSAY

Change to read:

• **Procedure**

Solution A: ▲1.0 g/L of▲ (USP 1-Dec-2019) sodium 1-heptanesulfonate in water

Mobile phase: Methanol, glacial acetic acid, and *Solution A* (550:5:450)

Standard solution: 0.05 mg/mL of USP Levobunolol Hydrochloride RS in *Mobile phase*

Sample solution: Nominally equivalent to 0.05 mg/mL of levobunolol hydrochloride in *Mobile phase* from Ophthalmic Solution

Chromatographic system

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

Mode: LC

Detector: UV 254 nm. ▲For *Identification B*, use a diode array detector in the range of 200–400 nm.▲ (USP 1-Dec-2019)

Column: 3.9-mm × 30-cm; 10-µm packing L1

Flow rate: 1.5 mL▲/min▲ (USP 1-Dec-2019)

Injection volume: 20 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 1.2

Relative standard deviation: NMT 1.5%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of levobunolol hydrochloride ($C_{17}H_{25}NO_3 \cdot HCl$) in the portion of Ophthalmic 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 Levobunolol Hydrochloride RS in the *Standard solution* (mg/mL)

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

Acceptance criteria: 90.0%–110.0%

IMPURITIES

• **Organic Impurities**

Mobile phase: Prepare as directed in the *Assay*.

Standard solution: 0.01 mg/mL each of USP Levobunolol Hydrochloride RS and USP Edetate Disodium RS in *Mobile phase*

Sample solution: Nominally equivalent to 1 mg/mL of levobunolol hydrochloride in *Mobile phase* from Ophthalmic Solution

Chromatographic system and **System suitability:** Proceed as directed in the *Assay* using wavelengths of UV 254 and 400 nm.

[NOTE—The relative retention times for levobunolol and edetate disodium are 1.0 and 0.46, respectively.]

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of any individual impurity at 254 nm in the portion of Ophthalmic Solution taken:

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

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

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

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

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

Calculate the percentage of any individual impurity (at 400 nm) at the retention time of levobunolol (at 254 nm) in the portion of Ophthalmic Solution taken:

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

r_U = peak response of the impurity from the *Sample solution* at 400 nm

r_S = peak response of levobunolol from the *Standard solution* at 254 nm

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

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

F = relative response factor for the impurity, 0.2

Acceptance criteria

Individual impurity: NMT 1%

Total impurities: NMT 2.5%. Disregard any peak at 254 nm with the retention time of edetate disodium.

SPECIFIC TESTS

- **ANTIMICROBIAL EFFECTIVENESS TESTING ⟨51⟩:** Meets the requirements
- **STERILITY TESTS ⟨71⟩, *Test for Sterility of the Product to Be Examined, Membrane Filtration*:** Meets the requirements
- **pH ⟨791⟩:** 5.5–7.5

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight containers. Protect from light. Store at controlled room temperature.
- **USP REFERENCE STANDARDS ⟨11⟩**

  USP Edetate Disodium RS

  USP Levobunolol Hydrochloride RS

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

Topic/Question	Contact	Expert Committee
LEVOBUNOLOL HYDROCHLORIDE OPHTHALMIC SOLUTION	Documentary Standards Support	SM32020 Small Molecules 3

Chromatographic Database Information: Chromatographic Database

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