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Lidocaine Hydrochloride Oral Topical Solution

DEFINITION

Lidocaine Hydrochloride Oral Topical Solution contains NLT 95.0% and NMT 105.0% of the labeled amount of lidocaine hydrochloride ($C_{14}H_{22}N_2O \cdot HCl$). It contains a suitable flavor and/or sweetening agent.

IDENTIFICATION

Change to read:

• **A.** ▲**Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*: 197K**▲ (CN 1-May-2020)

Sample: Place in a separator a volume of Oral Topical Solution, nominally equivalent to 300 mg of lidocaine hydrochloride, and extract with four 15-mL portions of chloroform, discarding the chloroform extracts. Add 2 mL of 2 N sodium hydroxide to the aqueous solution remaining in the separator, and extract with four 15-mL portions of chloroform. Combine the chloroform extracts, and evaporate to dryness. Dissolve the crystals in solvent hexane, evaporate the solvent, and dry the residue under vacuum over silica gel for 24 h. [Note—A rotary evaporator may be used.]

Acceptance criteria: Residue obtained from the *Sample* meets the requirements.

• **B.** 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: 4.85 g/L of monobasic potassium phosphate. Adjust with 10 N sodium hydroxide solution to a pH of 8.0.

Mobile phase: Acetonitrile and *Solution A* (30:70)

Standard solution: 0.85 mg/mL of USP Lidocaine RS (equivalent to 1 mg/mL of lidocaine hydrochloride) in *Mobile phase*

Sample solution: Nominally 1 mg/mL of lidocaine hydrochloride from Oral Topical Solution in *Mobile phase*

Chromatographic system

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

Mode: LC

Detector: UV 230 nm

Column: 4.6-mm × 15-cm; 3.5-µm packing L1

Column temperature: 45°

Flow rate: 1 mL/min

Injection volume: 20 µL

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 lidocaine hydrochloride ($C_{14}H_{22}N_2O \cdot HCl$) in the portion of Oral Topical Solution taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (M_{r1}/M_{r2}) \times 100$$

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

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

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

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

M_{r1} = molecular weight of lidocaine hydrochloride, 270.80

M_{r2} = molecular weight of lidocaine, 234.34

Acceptance criteria: 95.0%–105.0%

IMPURITIES

• **Organic Impurities**

Solution A, Mobile phase, and **Chromatographic system:** Proceed as directed in the *Assay*.

Standard solution: 0.0043 mg/mL of USP Lidocaine RS, 0.005 mg/mL of USP Lidocaine Related Compound H RS, and 0.00065 mg/mL of USP Ropivacaine Related Compound A RS (equivalent to 0.0005 mg/mL of 2,6-dimethylaniline) in *Mobile phase*

Sample solution: Nominally 5 mg/mL of lidocaine hydrochloride from Oral Topical Solution in *Mobile phase*

System suitability

Sample: *Standard solution*

Suitability requirements

Resolution: NLT 1.5 between the lidocaine related compound H and 2,6-dimethylaniline (ropivacaine related compound A free base) peaks

Relative standard deviation: NMT 2.0% for lidocaine, lidocaine related compound H, and 2,6-dimethylaniline

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of lidocaine related compound H in the portion of Oral Topical Solution taken:

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

r_U = peak response of lidocaine related compound H from the *Sample solution*

r_S = peak response of lidocaine related compound H from the *Standard solution*

C_S = concentration of USP Lidocaine Related Compound H RS in the *Standard solution* (mg/mL)

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

Calculate the percentage of 2,6-dimethylaniline in the portion of Oral Topical Solution taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (M_{r1}/M_{r2}) \times 100$$

r_U = peak response of 2,6-dimethylaniline from the *Sample solution*

r_S = peak response of 2,6-dimethylaniline from the *Standard solution*

C_S = concentration of USP Ropivacaine Related Compound A RS in the *Standard solution* (mg/mL)

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

M_{r1} = molecular weight of 2,6-dimethylaniline, 121.18

M_{r2} = molecular weight of ropivacaine related compound A, 157.64

Calculate the percentage of any unspecified degradation product in the portion of Oral Topical Solution taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (M_{r1}/M_{r2}) \times 100$$

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

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

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

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

M_{r1} = molecular weight of lidocaine hydrochloride, 270.80

M_{r2} = molecular weight of lidocaine, 234.34

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Lidocaine related compound H	0.33	0.5
2,6-Dimethylaniline	0.37	0.5
Lidocaine	1.0	—
Any unspecified degradation product	—	0.5
Total degradation products	—	2.0

SPECIFIC TESTS

• **pH** ⟨791⟩**:** 5.0–7.0

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in tight containers. Store at controlled room temperature.

• **USP Reference Standards** ⟨11⟩

USP Lidocaine RS

USP Lidocaine Related Compound H RS

2-Chloro-*N*-(2,6-dimethylphenyl)acetamide.

$C_{10}H_{12}ClNO$ 197.66

USP Ropivacaine Related Compound A RS

2,6-Dimethylaniline hydrochloride.

$C_8H_{11}N \cdot HCl$ 157.64

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

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

Chromatographic Database Information: Chromatographic Database

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