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Tetracaine Hydrochloride

$C_{15}H_{24}N_2O_2 \cdot HCl$ 300.82

Benzoic acid, 4-(butylamino)-, 2-(dimethylamino)ethyl ester, monohydrochloride;

2-(Dimethylamino)ethyl *p*-(butylamino)benzoate monohydrochloride CAS RN®: 136-47-0; UNII: 5NF5D4OPCI.

DEFINITION

Tetracaine Hydrochloride contains NLT 98.0% and NMT 102.0% of tetracaine hydrochloride ($C_{15}H_{24}N_2O_2 \cdot HCl$), calculated on the anhydrous basis.

IDENTIFICATION

- **A. Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*: 197K**
- **B. Identification Tests—General, *Chloride*⟨191⟩**

  Sample solution: 20 mg/mL

  Acceptance criteria: Meets the requirements
- **C.** 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**

Prepare the standard solutions and sample solutions immediately before use, or store them at a temperature of 2°–8°. Protect them from light.

Buffer: 1.36 g/L of monobasic potassium phosphate in water prepared as follows. Dissolve 1.36 g of monobasic potassium phosphate in about 600 mL water, and add 0.5 mL of phosphoric acid. Dilute with water to 1 L.

Mobile phase: See *Table 1*.

Table 1

Time (min)	Buffer (%)	Acetonitrile (%)
0	80	20
3	80	20
18	40	60
23	40	60
23.1	80	20
28	80	20

Diluent: Acetonitrile and water (20:80)

Standard stock solution: 0.4 mg/mL of USP Tetracaine Hydrochloride RS in *Diluent*. Sonicate for 5 min.

Standard solution: 0.04 mg/mL of USP Tetracaine Hydrochloride RS from the *Standard stock solution* in *Diluent*

Sample stock solution: 0.4 mg/mL of Tetracaine Hydrochloride in *Diluent*. Sonicate for 5 min.

Sample solution: 0.04 mg/mL of Tetracaine Hydrochloride from the *Sample stock solution* in *Diluent*

Chromatographic system

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

Mode: LC

Detector: UV 300 nm

Column: 4.6-mm × 15-cm; 5-µm packing L1

Temperatures

Column: 30°

Autosampler: 4°

Flow rate: 1.5 mL/min

Injection volume: 10 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 1.5

Relative standard deviation: NMT 0.73%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of tetracaine hydrochloride ($C_{15}H_{24}N_2O_2 \cdot HCl$) in the portion of Tetracaine Hydrochloride 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 Tetracaine Hydrochloride RS in the *Standard solution* (mg/mL)

C_U = concentration of Tetracaine Hydrochloride in the *Sample solution* (mg/mL)

Acceptance criteria: 98.0%–102.0% on the anhydrous basis

IMPURITIES

• **Residue on Ignition ⟨281⟩:** NMT 0.1%

Change to read:

• **Organic Impurities**

Buffer, Mobile phase, Diluent, and **Chromatographic system:** Proceed as directed in the *Assay*.

Standard solution: 0.004 mg/mL each of USP Tetracaine Hydrochloride RS, USP Tetracaine Related Compound B RS, USP Tetracaine Related Compound C RS, and USP Aminobenzoic Acid RS in *Diluent*

Sample solution: 1 mg/mL of Tetracaine Hydrochloride in *Diluent*

System suitability

Sample: *Standard solution*

[Note—See *Table 2* for the relative retention times.]

Suitability requirements

Resolution: NLT 5.0 between tetracaine and tetracaine related compound B

Relative standard deviation: NMT 5.0% for tetracaine hydrochloride

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of aminobenzoic acid, tetracaine related compound B, and tetracaine related compound C in the portion of Tetracaine Hydrochloride taken:

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

r_U = peak response of corresponding tetracaine related compound from the *Sample solution*

r_S = peak response of corresponding tetracaine related compound from the *Standard solution*

C_S = concentration of corresponding tetracaine related compound in the *Standard solution* (mg/mL)

C_U = concentration of Tetracaine Hydrochloride in the *Sample solution* (mg/mL)

Calculate the percentage of each unspecified impurity in the portion of Tetracaine Hydrochloride taken:

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

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

r_S = peak response from the *Standard solution*

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

C_U = concentration of Tetracaine Hydrochloride in the *Sample solution* (mg/mL)

Acceptance criteria: See *Table 2*. Disregard any impurity peaks less than 0.05%.

Table 2

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Aminobenzoic acid[a]	0.3	0.4
Tetracaine hydrochloride	1	—
Tetracaine ▲▲ (ERR 1-Jun-2020) related compound B	1.7	0.4
Tetracaine ▲▲ (ERR 1-Jun-2020) related compound C	2.1	0.4
Individual unspecified impurity	—	0.4
Total impurities	—	0.8

[a] 4-Aminobenzoic acid.

SPECIFIC TESTS

• **Water Determination, *Method I*⟨921⟩:** NMT 2.0%

• **Sterility Tests ⟨71⟩:** Where the label states that Tetracaine Hydrochloride is sterile, it meets the requirements.

• **Bacterial Endotoxins Test ⟨85⟩:** Where the label states that Tetracaine Hydrochloride is sterile or must be subjected to further processing during the preparation of injectable or other sterile dosage forms, it contains NMT 0.7 USP Endotoxin Units/mg of tetracaine hydrochloride.

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in tight, light-resistant containers.

• **Labeling:** Where it is intended for use in preparing injectable dosage forms, the label states that it is sterile or must be subjected to further processing during the preparation of injectable or other sterile dosage forms.

• **USP Reference Standards ⟨11⟩**

USP Aminobenzoic Acid RS

USP Tetracaine Hydrochloride RS

USP Tetracaine Related Compound B RS

4-(Butylamino)benzoic acid.

$C_{11}H_{15}NO_2$ 193.24

USP Tetracaine Related Compound C RS

Methyl 4-(butylamino)benzoate.

$C_{12}H_{17}NO_2$ 207.35

Topic/Question	Contact	Expert Committee
TETRACAINE HYDROCHLORIDE	Documentary Standards Support	SM52020 Small Molecules 5
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM52020 Small Molecules 5

Chromatographic Database Information: Chromatographic Database

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