

Status: Currently Official on 13-Feb-2025

Official Date: Official as of 01-May-2020

Document Type: USP Monographs

DocId: GUID-5158C0D0-3994-405A-8892-F99B415CB0DA_7_en-US

DOI: https://doi.org/10.31003/USPNF_M7960_07_01

DOI Ref: 5zc61

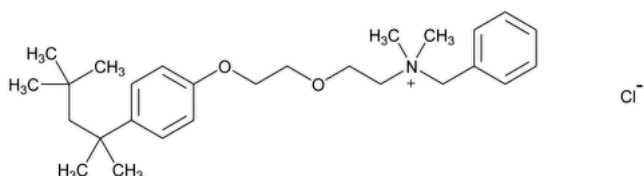
© 2025 USPC

Do not distribute

Benzethonium Chloride

To view the Notice from the Expert Committee that posted in conjunction with this accelerated revision, please click

<https://www.uspnf.com/rb-benzethonium-chloride-20190125>



$C_{27}H_{42}ClNO_2$ 448.08

Benzenemethanaminium, *N,N*-dimethyl-*N*-[2-[2-[4-(1,1,3,3-tetramethylbutyl)phenoxy]ethoxy]ethyl]-, chloride;

Benzyl(dimethyl)[2-[2-[*p*-(1,1,3,3-tetramethylbutyl)phenoxy]ethoxy]ethyl]ammonium chloride CAS RN®: 121-54-0.

DEFINITION

Benzethonium Chloride contains NLT 97.0% and NMT 103.0% of benzethonium chloride ($C_{27}H_{42}ClNO_2$), calculated on the dried basis.

IDENTIFICATION

• A.

Sample solution: 10 mg/mL

Analysis: Add 2 mL of [alcohol](#), 0.5 mL of 2 N [nitric acid](#), and 1 mL of [silver nitrate TS](#) to 1 mL of the *Sample solution*.

Acceptance criteria: A white precipitate, which is insoluble in 2 N nitric acid but soluble in [6 N ammonium hydroxide](#), is formed.

Change to read:

• B. **▲ SPECTROSCOPIC IDENTIFICATION TESTS (197), Infrared Spectroscopy:** 197A or 197K▲ (CN 1-May-2020)

• 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

Buffer: Dilute 20 mL of [triethylamine](#) with [water](#) to 1000 mL, and adjust with [phosphoric acid](#) to a pH of 3.0.

Mobile phase: [Acetonitrile](#) and *Buffer* (42:58)

Diluent: [Acetonitrile](#) and [water](#) (42:58)

System suitability solution: 0.15 mg/mL each of [USP Benzethonium Chloride RS](#) and [USP Methylbenzethonium Chloride RS](#) in *Diluent*

Standard solution: 0.15 mg/mL of [USP Benzethonium Chloride RS](#) in *Diluent*

Sample solution: 0.15 mg/mL of Benzethonium Chloride in *Diluent*

Chromatographic system

(See [Chromatography \(621\), System Suitability](#).)

Mode: LC

Detector: UV 225 nm

Column: 4.6-mm × 15-cm; 5-μm packing [L7](#)

Column temperature: 40°

Flow rate: 1 mL/min

Injection volume: 10 μL

Run time: 1.5 times the retention time of the methylbenzethonium peak

System suitability

Sample: *System suitability solution*

[NOTE—The relative retention times for benzethonium and methylbenzethonium are 0.7 and 1.0, respectively.]

Suitability requirements

Resolution: NLT 7.0 between the benzethonium and methylbenzethonium peaks

Tailing factor: NMT 2.0 for the benzethonium peak

Relative standard deviation: NMT 1.0% for the benzethonium peak

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of benzethonium chloride ($C_{27}H_{42}ClNO_2$) in the portion of Benzethonium Chloride taken:

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

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

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

C_S = concentration of [USP Benzethonium Chloride RS](#) in the *Standard solution* (mg/mL)

C_U = concentration of Benzethonium Chloride in the *Sample solution* (mg/mL)

Acceptance criteria: 97.0%–103.0% on the dried basis

IMPURITIES

- [RESIDUE ON IGNITION \(281\)](#): NMT 0.1%

Change to read:

- **ORGANIC IMPURITIES**

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

Standard solution: 1 µg/mL of [USP Benzethonium Chloride RS](#) in *Diluent*

Sample solution: 1 mg/mL of Benzethonium Chloride in *Diluent*

System suitability

Samples: *System suitability solution* and *Standard solution*

Suitability requirements: Proceed as directed in the Assay, except for *Relative standard deviation*.

Relative standard deviation: NMT 5.0%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of any individual impurity in the portion of Benzethonium Chloride taken:

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

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

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

C_S = concentration of [USP Benzethonium Chloride RS](#) in the *Standard solution* (mg/mL)

C_U = concentration of Benzethonium Chloride in the *Sample solution* (mg/mL)

Acceptance criteria

Total impurities: ▲NMT▲ (ERR 1-Feb-2019) 1.0%

SPECIFIC TESTS

- [LOSS ON DRYING \(731\)](#)

Analysis: Dry at 105° for 4 h.

Acceptance criteria: NMT 5.0%

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight, light-resistant containers.

- [USP REFERENCE STANDARDS \(11\)](#)

[USP Benzethonium Chloride RS](#)

[USP Methylbenzethonium Chloride RS](#)

Auxiliary Information - Please [check for your question in the FAQs](#) before contacting USP.

Topic/Question	Contact	Expert Committee
BENZETHONIUM CHLORIDE	Documentary Standards Support	SM12020 Small Molecules 1

Chromatographic Database Information: [Chromatographic Database](#)

Most Recently Appeared In:

Pharmacopeial Forum: Volume No. PF 42(6)

Current DocID: [GUID-5158C0D0-3994-405A-8892-F99B415CB0DA_7_en-US](#)

DOI: https://doi.org/10.31003/USPNE_M7960_07_01

DOI ref: [5zc61](#)

OFFICIAL