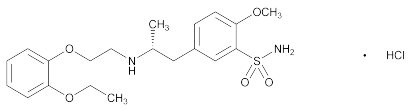
Tamsulosin Hydrochloride



$C_{20}H_{28}N_2O_5S \cdot HCl$ 444.97
Benzenesulfonamide, 5-[2-[[2-(2-ethoxyphenoxy)ethyl] amino]propyl]-2-methoxy-, monohydrochloride, (*R*)-;
(–)-(*R*)-5-[2-[[2-(*o*-Ethoxyphenoxy)ethyl]amino]propyl]-2-methoxybenzenesulfonamide monohydrochloride [106463-17-6].

DEFINITION

Tamsulosin Hydrochloride contains NLT 98.0% and NMT 102.0% of tamsulosin hydrochloride ($C_{20}H_{28}N_2O_5S \cdot HCl$), calculated on the dried basis.

IDENTIFICATION

Change to read:

- **A. INFRARED ABSORPTION** •⟨197⟩
  [NOTE—Methods described in ⟨197K⟩ or ⟨197A⟩ may be used.]• (IRA 1-Sep-2016)
- **B. IDENTIFICATION TESTS—GENERAL** ⟨191⟩, *Chloride*
  Sample solution: 7.5 mg/mL in water, using heat to dissolve the sample. In an ice bath, cool 5 mL of the solution. Add 3 mL of diluted nitric acid, and shake until mixed thoroughly. Allow to stand for 30 min at room temperature, and filter.
- **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

Change to read:

- **PROCEDURE**
  Buffer: Transfer 0.1 g of octanesulfonic acid sodium salt and 1.0 mL of phosphoric acid into 1 L of water, and mix.
  Mobile phase: Acetonitrile and *Buffer* (20:80)
  Diluent: •Acetonitrile and water (20:80)• (IRA 1-Sep-2016)
  Standard solution: •0.5 mg/mL• (IRA 1-Sep-2016) of USP Tamsulosin Hydrochloride RS in *Diluent*
  Sample solution: •0.5 mg/mL• (IRA 1-Sep-2016) of Tamsulosin Hydrochloride in *Diluent*
  Chromatographic system
  (See *Chromatography* ⟨621⟩, *System Suitability*.)
  Mode: LC
  Detector: UV 225 nm
  Column: 4.6-mm × 15-cm; 3.5-µm packing L1
  Column temperature: •35°• (IRA 1-Sep-2016)
  Flow rate: 1.5 mL/min
  Injection volume: 10 µL
  System suitability
  Sample: *Standard solution*
  Suitability requirements
  Relative standard deviation: NMT 0.85% for six replicate injections
  Analysis
  Samples: *Standard solution* and *Sample solution*
  Calculate the percentage of tamsulosin hydrochloride ($C_{20}H_{28}N_2O_5S \cdot HCl$) in the portion of Tamsulosin Hydrochloride taken:

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

r_U = peak response of tamsulosin from the *Sample solution*
r_S = peak response of tamsulosin from the *Standard solution*
C_S = concentration of USP Tamsulosin Hydrochloride RS in the *Standard solution* (mg/mL)
C_U = concentration of Tamsulosin Hydrochloride in the *Sample solution* (mg/mL)

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

IMPURITIES

- **RESIDUE ON IGNITION** ⟨281⟩**:** NMT 0.1%

Delete the following:

- •**HEAVY METALS,** *Method II* ⟨231⟩**:** NMT 20 ppm• (Official 1-Jan-2018)
- **ORGANIC IMPURITIES, PROCEDURE 1:** Use for impurities eluting before tamsulosin
  Buffer: Dissolve 8.7 mL of perchloric acid (70%) and 3.0 g of sodium hydroxide in 1900 mL of water. Adjust with 1 N sodium hydroxide to a pH of 2.0, and add sufficient water to make 2000 mL.
  Mobile phase: Acetonitrile and *Buffer* (3:7)
  System suitability solution: 25 µg/mL of Tamsulosin Hydrochloride and 50 µg/mL of propylparaben in *Mobile phase*
  Sample solution: 5.0 mg/mL of Tamsulosin Hydrochloride in *Mobile phase*
  Standard solution: 10 µg/mL of Tamsulosin Hydrochloride from the *Sample solution* in *Mobile phase*
  Chromatographic system
  (See *Chromatography* ⟨621⟩, *System Suitability*.)
  Mode: LC
  Detector: UV 225 nm
  Column: 4.6-mm × 15-cm; 5-µm packing L1
  Column temperature: 40°
  Flow rate: 1.3 mL/min
  Injection volume: 10 µL
  [NOTE—Record the chromatogram for NLT 1.5 times the retention time of tamsulosin.]
  System suitability
  Samples: *System suitability solution* and *Standard solution*
  Suitability requirements
  Resolution: NLT 12 between tamsulosin and propylparaben, *System suitability solution*. [NOTE—The elution order is tamsulosin followed by propylparaben.]
  Relative standard deviation: NMT 4% for six replicate injections, *Standard solution*
  Analysis
  Samples: *Sample solution* and *Standard solution*
  Calculate the percentage of any individual impurity eluting before the tamsulosin peak in the portion of Tamsulosin Hydrochloride taken:

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

r_U = peak response of each impurity eluting before tamsulosin from the *Sample solution*
r_S = peak response of tamsulosin from the *Standard solution*
C_S = concentration of the *Standard solution* (mg/mL)

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

Acceptance criteria: The reporting level for impurities is 0.05%.

Any individual impurity: NMT 0.10%. [NOTE—If present, the des-ethoxy and methoxy impurities eluting at the relative retention time of about 0.8 are not separated by this method, and should be integrated together to determine conformance. (Des-ethoxy impurity is 2-methoxy-5-[(2*R*)-2-[(2-phenoxyethyl)amino]propyl]benzenesulfonamide, and methoxy impurity is 2-methoxy-5-[(2*R*)-2-[[2-(2-methoxyphenoxy)ethyl]amino]propyl]benzenesulfonamide.) NMT 0.15% of the sum of des-ethoxy and methoxy impurities is found.]

- **ORGANIC IMPURITIES, PROCEDURE 2:** Use for impurities eluting after tamsulosin

Buffer, Sample solution, and **Standard solution:** Prepare as directed in *Procedure 1*.

[NOTE—Use the *Mobile phase* in *Procedure 1* to prepare the *Sample solution* and *Standard solution*.]

Mobile phase: Acetonitrile and *Buffer* (1:1)

Chromatographic system

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

Mode: LC

Detector: UV 225 nm

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

Column temperature: 40°

Flow rate: 1.0 mL/min

Injection volume: 10 µL

[NOTE—Record the chromatogram for NLT 5 times the retention time of tamsulosin.]

System suitability

Sample: *Standard solution*

Suitability requirements

Resolution: Use a column that meets the resolution requirements in *Procedure 1*.

Relative standard deviation: NMT 4% for six replicate injections

Analysis

Samples: *Sample solution* and *Standard solution*

Calculate the percentage of any individual impurity eluting after the tamsulosin peak in the portion of Tamsulosin Hydrochloride taken:

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

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

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

C_S = concentration of the *Standard solution* (mg/mL)

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

Acceptance criteria: The reporting level for impurities is 0.05%.

Any individual impurity: NMT 0.10%

Total impurities: NMT 0.2%, including all impurities in *Procedure 1* and *Procedure 2*

- **ENANTIOMERIC PURITY**

Mobile phase: Hexane, dehydrated alcohol, methanol, and diethylamine (650:200:150:1)

System suitability solution: 40 µg/mL of USP Racemic Tamsulosin Hydrochloride RS in methanol

Sample solution: 2.0 mg/mL of Tamsulosin Hydrochloride in methanol

Standard solution: 2 µg/mL of Tamsulosin Hydrochloride from the *Sample solution* in methanol

Chromatographic system

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

Mode: LC

Detector: UV 225 nm

Column: 4.6-mm × 25-cm; packing L51

Column temperature: 40°

Flow rate: 0.5 mL/min

Injection volume: 10 µL

System suitability

Sample: *System suitability solution*

[NOTE—The relative retention times for the *S*-enantiomer and tamsulosin are 0.8 and 1.0, respectively.]

Suitability requirements

Resolution: NLT 2 between the *S*-enantiomer and tamsulosin

Analysis

Samples: *Sample solution* and *Standard solution*

Calculate the percentage of the *S*-enantiomer in the portion of Tamsulosin Hydrochloride taken:

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

r_U = peak response of the *S*-enantiomer from the *Sample solution*

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

C_S = concentration of the *Standard solution* (mg/mL)

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

Acceptance criteria: NMT 0.3% of the *S*-enantiomer

SPECIFIC TESTS

- **LOSS ON DRYING** ⟨**731**⟩

Analysis: Dry at 105° for 2 h.

Acceptance criteria: NMT 0.5%

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight containers, and store at controlled room temperature.
- **USP REFERENCE STANDARDS** ⟨**11**⟩

USP Tamsulosin Hydrochloride RS

USP Racemic Tamsulosin Hydrochloride RS