Acceptance criteria
Individual impurities: See *Impurity Table 1*.

Impurity Table 1

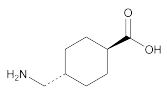
Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Trandolaprilate[a]	0.41	1.00	2.0
Trandolapril	1.00	1.00	—
Trandolapril related compound C	1.84	—	*
Trandolapril related compound D	1.96	0.78	5.0
Any other individual impurity	—	1.00	1.0
Total impurities	—	—	7.0

[a] (2*S*,3a*R*,7a*S*)-1-[(2*S*)-2-[[(1*S*)-1-Carboxy-3-phenylpropyl]amino]propanoyl] octahydro-1*H*-indole-2-carboxylic acid.
* Process-related impurity.

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight containers. Store at controlled room temperature.
- **USP REFERENCE STANDARDS** ⟨**11**⟩
  USP Trandolapril RS
  USP Trandolapril Related Compound C RS
  (2*S*,3a*R*,7a*S*)-1-[*N*-[(*S*)-1-Carboxy-3-cyclohexylpropyl]-L-alanyl]hexahydro-2-indolinecarboxylic acid 1-ethyl ester hydrochloride.
  $C_{24}H_{40}N_2O_5 \cdot HCl$ 473.05
  USP Trandolapril Related Compound D RS
  (*S*)-Ethyl 2-[(3*S*,5a*S*,9a*R*,10a*S*)-3-methyl-1,4-dioxodecahydropyrazino[1,2-a]indol-2(1*H*)-yl)]-4-phenylbutanoate.
  $C_{24}H_{32}N_2O_4$ 412.52

Tranexamic Acid



$C_8H_{15}NO_2$ 157.2
trans-4-(Aminomethyl)cyclohexanecarboxylic acid;
Cyclohexanecarboxylic acid, 4-(aminomethyl)-, *trans* [1197-18-8].

DEFINITION

Tranexamic Acid contains NLT 99.0% and NMT 101.0% of $C_8H_{15}NO_2$, calculated on the dried basis.

IDENTIFICATION

- **INFRARED ABSORPTION** ⟨**197K**⟩

ASSAY

- **PROCEDURE**
  Sample solution: 140 mg of Tranexamic Acid in 20 mL of glacial acetic acid
  Titrimetric system
  (See *Titrimetry* ⟨541⟩.)
  Mode: Direct titration
  Titrant: 0.1 N perchloric acid VS
  Endpoint detection: Potentiometric
  Analysis
  Sample: *Sample solution*
  Titrate with 0.1 N perchloric acid VS, determining the endpoint potentiometrically. Carry out a blank titration.
  Each mL of 0.1 N perchloric acid is equivalent to 15.72 mg of $C_8H_{15}NO_2$.
  Acceptance criteria: 99.0%–101.0% on the dried basis

IMPURITIES

Inorganic Impurities

- **RESIDUE ON IGNITION** ⟨**281**⟩**:** NMT 0.1%; 1-g sample is used
- **HEAVY METALS,** *Method II* ⟨**231**⟩**:** NMT 10 ppm
- **CHLORIDE AND SULFATE,** *Chloride* ⟨**221**⟩**:** A 0.51-g portion shows no more chloride than corresponds to 0.1 mL of 0.020 N hydrochloric acid (0.014%).

Organic Impurities

- **PROCEDURE**
  Mobile phase: Dissolve 11.0 g of anhydrous monobasic sodium phosphate in 500 mL of water, and add 5 mL of triethylamine, followed by 1.4 g of sodium lauryl sulfate. Adjust with diluted phosphoric acid (10% w/w) to a pH of 2.5, and dilute with water to 600 mL. Mix this solution with 400 mL of methanol.
  System suitability solution: 0.2 mg/mL of USP Tranexamic Acid RS and 0.002 mg/mL of USP Tranexamic Acid Related Compound C RS in water
  Standard solution: 50 µg/mL of USP Tranexamic Acid RS in water
  Sample solution: 10 mg/mL of Tranexamic Acid in water
  Chromatographic system
  (See *Chromatography* ⟨621⟩, *System Suitability*.)
  Mode: LC
  Detector: UV 220 nm
  Column: 4.6-mm × 25-cm; 5-µm packing L1
  Flow rate: 1 mL/min
  Injection size: 20 µL
  Run time: 3 times the retention time of tranexamic acid
  System suitability
  Sample: *System suitability solution*
  Suitability requirements
  Resolution: NLT 2.0 between tranexamic acid and 0.002 mg/mL of tranexamic acid related compound C
  Analysis
  Samples: *Standard solution* and *Sample solution*
  Calculate the percentage of each individual impurity in the portion of Tranexamic Acid taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (0.1F)$$

r_U = peak response for each impurity from the *Sample solution*
r_S = peak response for tranexamic acid from the *Standard solution*
C_S = concentration of USP Tranexamic Acid RS in the *Standard solution* (µg/mL)
C_U = concentration of Tranexamic Acid in the *Sample solution* (mg/mL)
F = relative response factor (see *Impurity Table 1*)

  Acceptance criteria
  Individual impurities: See *Impurity Table 1*.
  Total impurities: NMT 0.2%
  [NOTE—Disregard any peak less than 0.025%.]

Impurity Table 1

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Tranexamic acid related compound A[a]	2.1	1	0.1
Tranexamic acid related compound B[b]	1.5	1.2	0.2

[a] *trans,trans*-4,4′-(Iminodimethylene)di(cyclohexanecarboxylic)acid.
[b] *cis*-4-(Aminomethyl)cyclohexanecarboxylic acid.
[c] (*RS*)-4-(Aminomethyl) cyclohex-1-enecarbocylic acid.
[d] 4-Aminomethyl benzoic acid.

Impurity Table 1 *(Continued)*

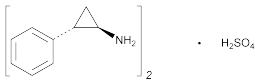
Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Tranexamic acid related compound C[c]	1.1	0.005	0.1
Tranexamic Acid	1.0	1.0	—
Tranexamic acid related compound D[d]	1.3	0.006	0.1

[a] *trans,trans*-4,4′-(Iminodimethylene)di(cyclohexanecarboxylic)acid.
[b] *cis*-4-(Aminomethyl)cyclohexanecarboxylic acid.
[c] (*RS*)-4-(Aminomethyl) cyclohex-1-enecarbocylic acid.
[d] 4-Aminomethyl benzoic acid.

SPECIFIC TESTS
- **Loss on Drying** ⟨**731**⟩**:** Dry 1.00 g at 105° under vacuum for 2 h. It loses NMT 0.5% of its weight.

ADDITIONAL REQUIREMENTS
- **Packaging and Storage:** Preserve in tight containers, and store at a temperature not exceeding 30°.
- **USP Reference Standards** ⟨**11**⟩
  USP Tranexamic Acid RS
  USP Tranexamic Acid Related Compound C RS
  (*RS*)-4-(Aminomethyl)cyclohex-1-enecarbocylic acid.
  $C_8H_{13}NO_2$ 155

Tranylcypromine Sulfate



$(C_9H_{11}N)_2 \cdot H_2SO_4$ 364.46
Cyclopropanamine, 2-phenyl-, *trans*-(±)-, sulfate (2:1); (±)-*trans*-2-Phenylcyclopropylamine sulfate (2:1) [13492-01-8].

DEFINITION
Tranylcypromine Sulfate contains NLT 98.0% and NMT 102.0% of $(C_9H_{11}N)_2 \cdot H_2SO_4$, calculated on the dried basis.

IDENTIFICATION
- **A. Infrared Absorption** ⟨**197K**⟩
- **B.** The retention time of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.
- **C. Identification Tests—General,** *Sulfate* ⟨**191**⟩**:** Meets the requirements

ASSAY
- **Procedure**
  Buffer: Dissolve 3.4 g of monobasic ammonium phosphate in about 900 mL of water in a 1-L volumetric flask. Adjust with phosphoric acid to a pH of 2.2 ± 0.1, and dilute with water to volume.
  Mobile phase: Methanol and *Buffer* (3:7)
  0.05 N sulfuric acid: Cautiously add 1.3 mL of sulfuric acid to 100 mL of water, cool to room temperature, and dilute to 1000 mL.
  Diluent: Methanol, water, and *0.05 N sulfuric acid* (1:3:1)
  Standard stock solution: Using a sonicator, dissolve USP Tranylcypromine Sulfate RS in *0.05 N sulfuric acid* and methanol (about 30% of the final volume of each solvent). Dilute with *Diluent* to obtain a 400 µg/mL solution.
  Standard solution: 40 µg/mL of USP Tranylcypromine Sulfate RS in *Diluent*, prepared from the *Standard stock solution*
  Sample stock solution: Using a sonicator, dissolve Tranylcypromine Sulfate in methanol and *0.05 N sulfuric acid* (about 30% of the final volume of each solvent). Dilute with *Diluent* to obtain a 400 µg/mL solution.
  Sample solution: 40 µg/mL tranylcypromine sulfate in *Diluent*, prepared from the *Sample stock solution*
  Chromatographic system
  (See *Chromatography* ⟨621⟩, *System Suitability*.)
  Mode: LC
  Detector: UV 220 nm
  Column: 4.6-mm × 25-cm; 4-µm packing L11
  Column temperature: 30°
  Flow rate: 1 mL/min
  Injection size: 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 $(C_9H_{11}N)_2 \cdot H_2SO_4$ in the portion 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 Tranylcypromine Sulfate RS in the *Standard solution* (µg/mL)
  C_U = concentration of tranylcypromine sulfate in the *Sample solution* (µg/mL)
  Acceptance criteria: 98.0%–102.0% on the dried basis

IMPURITIES
Inorganic Impurities
- **Residue on Ignition** ⟨**281**⟩**:** NMT 0.1%
- **Heavy Metals,** *Method II* ⟨**231**⟩**:** NMT 20 ppm

Organic Impurities
- **Procedure**
  Buffer, 0.05 N sulfuric acid, and **Diluent:** Proceed as directed in the *Assay*.
  Solution A: Methanol and *Buffer* (3:17)
  Solution B: Methanol and *Buffer* (3:7)
  Mobile phase: See the gradient table below.

Time (min)	Solution A (%)	Solution B (%)
0	100	0
20	100	0
25	0	100
37	0	100
39	100	0
45	100	0

  Standard stock solution: 14 µg/mL of USP Tranylcypromine Sulfate RS, and 60 µg/mL each of USP Tranylcypromine Related Compound A RS and USP Tranylcypromine Related Compound B RS in *Diluent*. [NOTE—Sonicate as needed.]
  Standard solution: Transfer a portion of the *Standard stock solution* to a suitable volumetric flask containing methanol and *0.05 N sulfuric acid* (30% of the final volume of each solvent). Dilute with *Diluent* to volume to obtain a solution containing 0.7 µg/mL of USP Tranylcypromine Sulfate RS and 3.0 µg/mL each of USP Tranylcypromine Related Compound A RS and USP Tranylcypromine Related Compound B RS.
  Sample solution: Using a sonicator, dissolve Tranylcypromine Sulfate in methanol and *0.05 N sulfuric acid* (about 30% of the final volume of each solvent). Dilute with *Diluent* to obtain a solution containing 680 µg/mL of tranylcypromine sulfate.