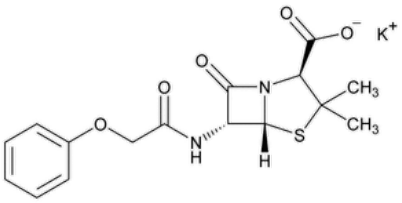
Status: Currently Official on 16-Feb-2025
Official Date: Official as of 01-May-2020
Document Type: USP Monographs
DocId: GUID-5D85A2E2-FC05-4089-A811-280900672B46_2_en-US
DOI: https://doi.org/10.31003/USPNF_M61960_02_01
DOI Ref: ci3tf

Penicillin V Potassium



$C_{16}H_{17}KN_2O_5S$ 388.48

4-Thia-1-azabicyclo[3.2.0]heptane-2-carboxylic acid, 3,3-dimethyl-7-oxo-6-[(phenoxyacetyl)amino]-, monopotassium salt, [2*S*-(2α,5α,6β)]-;

Monopotassium (2*S*,5*R*,6*R*)-3,3-dimethyl-7-oxo-6-(2-phenoxyacetamido)-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylate CAS RN®: 132-98-9; UNII: 146T0TU1JB.

DEFINITION

Penicillin V Potassium has a potency of NLT 1380 and NMT 1610 Penicillin V Units/mg.

IDENTIFICATION

Change to read:

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

• **B.** The retention time of the penicillin V peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

• **C.**

Diluent: Glycerin and water (25:14)

Solution A: 106 mg/mL of sodium carbonate in water

Solution B: 120 mg/mL of sodium sulfide in *Diluent*, prepared as follows. Dissolve sodium sulfide in *Diluent*, using about 45% of the final volume and heat. Allow to cool, and dilute with *Diluent* to the final volume.

Solution C: 150 mg/mL of tartaric acid in water

Sample solution: 0.1 g of Penicillin V Potassium in 2 mL of water

Analysis

Part 1: Add 1 mL of *Solution A* to the *Sample solution* and heat.

Part 2: To the hot solution from *Part 1* add 0.05 mL of *Solution B*.

Part 3: Cool the mixture from *Part 2* in iced water and add 2 mL of *Solution C*. Allow to stand.

Acceptance criteria: Meets the requirements for *Parts 1*, *2*, and *3*

Part 1: No precipitate is formed.

Part 2: No precipitate is formed.

Part 3: A white precipitate is formed.

ASSAY

• **Procedure**

Mobile phase: Acetonitrile, glacial acetic acid, and water (350:5.75:650)

System suitability solution: 2.5 mg/mL each of USP Penicillin G Potassium RS and USP Penicillin V Potassium RS in *Mobile phase*

Standard solution: 2.5 mg/mL of USP Penicillin V Potassium RS in *Mobile phase*

Sample solution: 2.5 mg/mL of Penicillin V Potassium in *Mobile phase*

Chromatographic system

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

Mode: LC

Detector: UV 254 nm

Column: 3.9-mm × 30-cm; 10-µm packing L1

Flow rate: 1 mL/min

Injection volume: 10 µL

System suitability

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

[NOTE—The relative retention times for *p*-hydroxypenicillin V, penicillin G, and penicillin V are about 0.4, 0.8, and 1.0, respectively.]

Suitability requirements

Resolution: NLT 3.0 between penicillin G and penicillin V, *System suitability solution*

Relative standard deviation: NMT 1.0%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the potency of penicillin V potassium, in Penicillin V Units/mg, in the portion of Penicillin V Potassium taken:

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

r_U = sum of the *p*-hydroxypenicillin V and penicillin V peak responses from the *Sample solution*

r_S = sum of the *p*-hydroxypenicillin V and penicillin V peak responses from the *Standard solution*

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

C_U = concentration of Penicillin V Potassium in the *Sample solution* (mg/mL)

P = potency of USP Penicillin V Potassium RS (Penicillin V Units/mg)

Acceptance criteria: 1380–1610 Penicillin V Units/mg

IMPURITIES

• **LIMIT OF PHENOXYACETIC ACID**

Mobile phase: Acetonitrile, glacial acetic acid, and water (35:1:65)

Diluent: pH 6.6 phosphate buffer (see *Reagents, Indicators, and Solutions—Buffer Solutions*)

Standard solution: 0.1 mg/mL of phenoxyacetic acid in *Diluent*

Sample solution: 20 mg/mL of Penicillin V Potassium in *Diluent*. Use this solution on the day prepared.

Chromatographic system

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

Mode: LC

Detector: UV 254 nm

Column: 4.6-mm × 25-cm; 5-µm packing L1

Flow rate: 1 mL/min

Injection volume: 20 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 1.5

Relative standard deviation: NMT 2.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of phenoxyacetic acid in the portion of Penicillin V Potassium taken:

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

r_U = phenoxyacetic acid peak response from the *Sample solution*

r_S = phenoxyacetic acid peak response from the *Standard solution*

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

C_U = concentration of Penicillin V Potassium in the *Sample solution* (mg/mL)

Acceptance criteria: NMT 0.5%

• **LIMIT OF *p*-HYDROXYPENICILLIN V**

Mobile phase, System suitability solution, Standard solution, Sample solution, Chromatographic system, and **System suitability:** Proceed as directed in the *Assay*.

Analysis

Sample: *Sample solution*

Calculate the percentage of *p*-hydroxypenicillin V in the portion of Penicillin V Potassium taken:

$$\text{Result} = (r_U/r_T) \times 100$$

r_U = *p*-hydroxypenicillin V peak response from the *Sample solution*

r_T = sum of the *p*-hydroxypenicillin V and penicillin V peak responses from the *Sample solution*

Acceptance criteria: NMT 5.0%

SPECIFIC TESTS

- **Optical Rotation** ⟨781S⟩, *Specific Rotation*

  Sample solution: 10 mg/mL of Penicillin V Potassium in carbon dioxide-free water

  Acceptance criteria: +220° to +235°

- **Crystallinity** ⟨695⟩**:** Meets the requirements

- **pH** ⟨791⟩

  Sample solution: 30 mg/mL of Penicillin V Potassium in water

  Acceptance criteria: 4.0–7.5

- **Loss on Drying** ⟨731⟩

  Sample: 100 mg of Penicillin V Potassium

  Analysis: Dry the *Sample* in a capillary-stoppered bottle under vacuum at 60° for 3 h.

  Acceptance criteria: NMT 1.5%

ADDITIONAL REQUIREMENTS

- **Packaging and Storage:** Preserve in tight containers.
- **Labeling:** Label it to indicate that it is to be used in the manufacture of nonparenteral drugs only.
- **USP Reference Standards** ⟨11⟩

  USP Penicillin G Potassium RS

  USP Penicillin V Potassium RS

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

Topic/Question	Contact	Expert Committee
PENICILLIN V POTASSIUM	Documentary Standards Support	SM12020 Small Molecules 1
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM12020 Small Molecules 1

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. PF 41(3)

Current DocID: GUID-5D85A2E2-FC05-4089-A811-280900672B46_2_en-US

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