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Ampicillin Sodium

$C_{16}H_{18}N_3NaO_4S$ 371.39
4-Thia-1-azabicyclo[3.2.0]heptane-2-carboxylic acid, [6-(aminophenylacetyl)amino]-3,3-dimethyl-7-oxo-, monosodium salt, [2S-[2 α ,5 α ,6 β (S*)]]-;
Monosodium D-(-)-6-(2-amino-2-phenylacetamido)-3,3-dimethyl-7-oxo-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylate CAS RN[®]: 69-52-3;
UNII: JFN36L5S8K.

DEFINITION

Ampicillin Sodium has a potency equivalent to NLT 845 μ g and NMT 988 μ g of ampicillin ($C_{16}H_{19}N_3O_4S$) per mg, calculated on the anhydrous basis.

IDENTIFICATION

Change to read:

- **A.**  [SPECTROSCOPIC IDENTIFICATION TESTS \(197\)](#), *Infrared Spectroscopy: 197M*  (CN 1-MAY-2020)
- **B.** [IDENTIFICATION TESTS—GENERAL, Sodium \(191\)](#).

ASSAY

• **PROCEDURE**

Diluent: Water, 1 M monobasic potassium phosphate, and 1 N acetic acid (989:10:1)
Mobile phase: Acetonitrile, water, 1 M monobasic potassium phosphate, and 1 N acetic acid (80:909:10:1)
Standard solution: 1 mg/mL of [USP Ampicillin RS](#) in *Diluent* using shaking and sonication, if necessary, to dissolve. Use this solution promptly after preparation.
System suitability solution: 0.12 mg/mL of caffeine in *Standard solution*
Sample solution: [NOTE—Ampicillin Sodium is hygroscopic. Minimize exposure to the atmosphere, and weigh promptly.] Equivalent to 1 mg/mL of anhydrous ampicillin in *Diluent*. [NOTE—Use this solution promptly after preparation.]

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

Mode: LC
Detector: UV 254 nm
Column
Pre-column: 4-mm $\times$ 5-cm; 5- to 10- μ m packing L1
Analytical column: 4-mm $\times$ 30-cm; 5- to 10- μ m packing L1
Flow rate: 2 mL/min
Injection size: 20 μ L

System suitability
Samples: *Standard solution* and *System suitability solution*
[NOTE—The relative retention times for ampicillin and caffeine are 0.5 and 1.0, respectively, *System suitability solution*.]
Suitability requirements
Resolution: NLT 2.0 between the caffeine and the ampicillin peaks, *System suitability solution*
Tailing factor: NMT 1.4, *Standard solution*
Capacity factor: NMT 2.5, *Standard solution*
Relative standard deviation: NMT 2.0%, *Standard solution*

Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the quantity, in μ g, of $C_{16}H_{19}N_3O_4S$ in each mg of Ampicillin Sodium taken:

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

r_U = peak response from the *Sample solution*

r_S = peak response from the *Standard solution*

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

C_U = nominal concentration of Ampicillin Sodium in the *Sample solution* (mg/mL)

P = potency of [USP Ampicillin RS](#) (µg/mg)

Acceptance criteria: 845–988 µg/mg on the anhydrous basis

IMPURITIES

ORGANIC IMPURITIES

• PROCEDURE 1: LIMIT OF METHYLENE CHLORIDE

Internal standard solution: 2.1 mg/mL of dioxane in dimethyl sulfoxide

Standard solution: 0.33 mg/mL of methylene chloride in *Internal standard solution*

Sample solution: 166.7 mg/mL of Ampicillin Sodium in *Internal standard solution*

Chromatographic system

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

Mode: GC

Detector: Flame ionization

Column: 1.8-m × 4-mm glass column packed with a 10% phase G39 on unsilanized support S1A

Temperature

Column: 65°

Injector: 100°

Detector block: 260°

Carrier gas: Nitrogen

Flow rate: 60 mL/min

Injection size: 1 µL

System suitability

Sample: *Standard solution*

[NOTE—The relative retention times for methylene chloride and dioxane are 0.5 and 1.0, respectively.]

Suitability requirements

Resolution: NLT 4 between methylene chloride and dioxane

Relative standard deviation: NMT 5%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of methylene chloride in the portion of Ampicillin Sodium taken:

$$\text{Result} = (R_U/R_S) \times (C_S/C_U) \times 100$$

R_U = peak response ratio of methylene chloride to dioxane from the *Sample solution*

R_S = peak response ratio of methylene chloride to dioxane from the *Standard solution*

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

C_U = nominal concentration of Ampicillin Sodium in the *Sample solution* (mg/mL)

Acceptance criteria: NMT 0.2%.

• PROCEDURE 2: [DIMETHYLANILINE \(223\)](#): Meets the requirement

SPECIFIC TESTS

• [CRYSTALLINITY \(695\)](#): Meets the requirements. [NOTE—Ampicillin Sodium in the freeze-dried form is exempt from this requirement.]

• [pH \(791\)](#): 8.0–10.0

Sample solution: 10.0 mg/mL of ampicillin

• [WATER DETERMINATION, Method I \(921\)](#): NMT 2.0%

• [STERILITY TESTS \(71\)](#): Where the label states that Ampicillin Sodium is sterile, it meets the requirements.

• [BACTERIAL ENDOTOXINS TEST \(85\)](#): Where the label states that Ampicillin Sodium is sterile or the label states that Ampicillin Sodium must be subjected to further processing during the processing of injectable dosage forms, it contains NMT 0.15 USP Endotoxin Unit/mg of ampicillin.

ADDITIONAL REQUIREMENTS

• **PACKAGING AND STORAGE:** Preserve in tight 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 dosage forms.

• [USP REFERENCE STANDARDS \(11\)](#).

[USP Ampicillin RS](#)

[USP Ampicillin Sodium RS](#)

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

Topic/Question	Contact	Expert Committee
AMPICILLIN SODIUM	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:

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