• **USP REFERENCE STANDARDS** ⟨11⟩
USP Amoxicillin RS
USP Amoxicillin Related Compound A RS
(2*S*,5*R*,6*R*)-6-Amino-3,3-dimethyl-7-oxo-4-thia-1-azabicyclo [3.2.0]heptane-2-carboxylic acid; 6-aminopenicillanic acid.
$C_8H_{12}N_2O_3S$ 216.26
USP Amoxicillin Related Compound D RS
(4*S*)-2-{[(*R*)-2-Amino-2-(4-hydroxyphenyl)acetamido] (carboxy)methyl}-5,5-dimethylthiazolidine-4-carboxylic acid; amoxicillin open ring.
$C_{16}H_{21}N_3O_6S$ 383.42
USP Endotoxin RS

Amoxicillin Boluses

» Amoxicillin Boluses contain not less than 90.0 percent and not more than 110.0 per cent of the labeled amount of amoxicillin ($C_{16}H_{19}N_3O_5S$).

Packaging and storage—Preserve in tight containers, and store at controlled room temperature.

Labeling—Label Boluses to indicate that they are for veterinary use only.

USP Reference standards ⟨11⟩**—**
USP Amoxicillin RS

Identification—

Test solution—To a portion of powdered Boluses add 0.1 N hydrochloric acid to obtain a *Test solution* containing about 4 mg of amoxicillin per mL. Use within 10 minutes after preparation.

Application volume, Developing solvent system, Procedure—Proceed as directed for the *Identification* test under *Amoxicillin Tablets*.

Disintegration ⟨701⟩: 30 minutes, simulated gastric fluid being used instead of water.

Water, *Method I* ⟨921⟩: not more than 7.5%.

Assay—

Diluent, Mobile phase, Standard preparation, and *Chromatographic system*—Prepare as directed in the *Assay* under *Amoxicillin*.

Assay preparation—Weigh and finely powder not fewer than 5 Boluses. Transfer an accurately weighed portion of the powder, equivalent to about 250 mg of amoxicillin, to a 250-mL volumetric flask, add *Diluent* to volume, and mix. Sonicate if necessary to ensure complete dissolution of the amoxicillin. Pass a portion of this solution through a filter of 1- µm or finer porosity, and use the filtrate as the *Assay preparation*. [NOTE—Use this solution within 6 hours.]

Procedure—Proceed as directed for *Procedure* in the *Assay* under *Amoxicillin*. Calculate the quantity, in mg, of amoxicillin ($C_{16}H_{19}N_3O_5S$) in the portion of Boluses taken by the formula:

$$0.25CP(r_U / r_S)$$

in which the terms are as defined therein.

Amoxicillin Capsules

DEFINITION
Amoxicillin Capsules contain the equivalent of NLT 90.0% and NMT 120.0% of the labeled amount of amoxicillin ($C_{16}H_{19}N_3O_5S$).

IDENTIFICATION
• 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: Dissolve 6.8 g/L of monobasic potassium phosphate in water. Adjust with a 45% (w/w) solution of potassium hydroxide to a pH of 5.0 ± 0.1.
Mobile phase: Acetonitrile and *Buffer* (1:24)
Standard solution: 1.2 mg/mL of USP Amoxicillin RS in *Buffer*. [NOTE—Use this solution within 6 h.]
Sample solution: Remove, as completely as possible, the contents of NLT 20 Capsules. Mix the combined contents, and transfer a quantity, equivalent to 200 mg of anhydrous amoxicillin, to a 200-mL volumetric flask. Add *Buffer* to volume. Sonicate if necessary to ensure complete dissolution. [NOTE—Use this solution within 6 h.]
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 230 nm
Column: 4-mm × 25-cm;10-µm packing L1
Flow rate: 1.5 mL/min
Injection size: 10 µL
System suitability
Sample: *Standard solution*
Suitability requirements
Tailing factor: NMT 2.5
Relative standard deviation: NMT 2.0%
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the percentage of $C_{16}H_{19}N_3O_5S$ in the portion of Capsules taken:

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

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of USP Amoxicillin RS in the *Standard solution* (mg/mL)
C_U = nominal concentration of amoxicillin in the *Sample solution* (mg/mL)
P = potency of amoxicillin in USP Amoxicillin RS (µg/mg)
F = conversion factor, 0.001 mg/µg
Acceptance criteria: 90.0%–120.0%

PERFORMANCE TESTS
• **DISSOLUTION** ⟨711⟩
Test 1
Medium: Water; 900 mL
Apparatus 1: 100 rpm, for Capsules containing 250 mg
Apparatus 2: 75 rpm, for Capsules containing 500 mg
Time: 60 min
Analytical wavelength: UV 272 nm
Standard solution: USP Amoxicillin RS in *Medium*
Sample solution: Pass a portion of the solution under test through a suitable filter. Dilute with *Medium*, if necessary, to a concentration that is similar to that of the *Standard solution*.
Tolerances: NLT 80% (Q) of the labeled amount of $C_{16}H_{19}N_3O_5S$ is dissolved.
Test 2: If the product complies with this test, the labeling indicates that it meets USP *Dissolution Test 2*.
Medium: Water; 900 mL
Apparatus 1: 100 rpm
Time: 90 min
Analytical wavelength: UV 272 nm
Standard solution: USP Amoxicillin RS in *Medium*
Sample solution: Pass a portion of the solution under test through a suitable filter. Dilute with *Medium*, if necessary, to a concentration that is similar to that of the *Standard solution*.

Tolerances: NLT 80% (Q) of the labeled amount of $C_{16}H_{19}N_3O_5S$ is dissolved.

- **UNIFORMITY OF DOSAGE UNITS ⟨905⟩:** Meet the requirements

SPECIFIC TESTS

- **MICROBIAL ENUMERATION TESTS ⟨61⟩** and **TESTS FOR SPECIFIED MICROORGANISMS ⟨62⟩:** The total aerobic microbial count does not exceed 10^3 cfu/g, and the total combined molds and yeasts count does not exceed 10^2 cfu/g.

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight containers, and store at controlled room temperature.
- **LABELING:** When more than one *Dissolution* test is given, the labeling states the *Dissolution* test used only if *Test 1* is not used.
- **USP REFERENCE STANDARDS ⟨11⟩**
  USP Amoxicillin RS

Amoxicillin and Clavulanate Potassium for Oral Suspension

DEFINITION

Amoxicillin and Clavulanate Potassium for Oral Suspension contains the equivalent of NLT 90.0% and NMT 120.0% of the labeled amount of amoxicillin ($C_{16}H_{19}N_3O_5S$) and the equivalent of NLT 90.0% and NMT 125.0% of the labeled amount of clavulanic acid ($C_8H_9NO_5$). It contains one or more suitable buffers, colors, flavors, preservatives, stabilizers, sweeteners, and suspending agents.

IDENTIFICATION

- The retention times of the major peaks of the *Sample solution* correspond to those of the *Standard solution*, as obtained in the *Assay*.

ASSAY

- **PROCEDURE**

Buffer: 7.8 g of monobasic sodium phosphate in 900 mL of water. Adjust with phosphoric acid or 10 N sodium hydroxide to a pH of 4.4 ± 0.1, and dilute with water to 1000 mL.

Mobile phase: Methanol and *Buffer* (1:19). Pass through a suitable filter.

Standard solution: 0.5 mg/mL of USP Amoxicillin RS and 0.2 mg/mL of USP Clavulanate Lithium RS in water

Sample solution: Equivalent to 0.5 mg/mL of amoxicillin, from constituted Amoxicillin and Clavulanate Potassium for Oral Suspension in water. Stir by mechanical means for 10 min, and filter. [NOTE—Constitute as directed in the labeling; use within 1 h.]

Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 220 nm
Column: 4-mm × 30-cm; 3- to 10-µm packing L1
Flow rate: 2 mL/min
Injection size: 20 µL

System suitability
Sample: *Standard solution*
[NOTE—The relative retention times for clavulanic acid and amoxicillin are about 0.5 and 1.0, respectively.]
Suitability requirements
Resolution: NLT 3.5 between the amoxicillin and clavulanic acid peaks
Tailing factor: NMT 1.5 for each analyte peak
Relative standard deviation: NMT 2.0%

Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the percentage of $C_{16}H_{19}N_3O_5S$ in the Amoxicillin and Clavulanate Potassium for Oral Suspension taken:

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

r_U = peak response of amoxicillin from the *Sample solution*
r_S = peak response of amoxicillin from the *Standard solution*
C_S = concentration of USP Amoxicillin RS in the *Standard solution* (mg/mL)
C_U = nominal concentration of amoxicillin in the *Sample solution* (mg/mL)
P = potency of amoxicillin in USP Amoxicillin RS (µg/mg)
F = conversion factor, 0.001 mg/µg

Calculate the percentage of $C_8H_9NO_5$ in the Amoxicillin and Clavulanate Potassium for Oral Suspension taken:

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

r_U = peak response of clavulanic acid from the *Sample solution*
r_S = peak response of clavulanic acid from the *Standard solution*
C_S = concentration of USP Clavulanate Lithium RS in the *Standard solution* (mg/mL)
C_U = nominal concentration of clavulanic acid in the *Sample solution* (mg/mL)
P = potency of clavulanic acid in USP Clavulanate Lithium RS (mg/mg)

Acceptance criteria: 90.0%–120.0% of the labeled amount of $C_{16}H_{19}N_3O_5S$ and 90.0%–125.0% of the labeled amount of $C_8H_9NO_5$

PERFORMANCE TESTS

- **DELIVERABLE VOLUME ⟨698⟩**
  For powder packaged in multiple-unit containers: Meets the requirements
- **UNIFORMITY OF DOSAGE UNITS ⟨905⟩**
  For powder packaged in single-unit containers: Meets the requirements

SPECIFIC TESTS

- **pH ⟨791⟩:** 3.8–6.6, in the suspension constituted as directed in the labeling, the test being performed immediately after constitution
- **MICROBIAL ENUMERATION TESTS ⟨61⟩** and **TESTS FOR SPECIFIED MICROORGANISMS ⟨62⟩:** The total aerobic microbial count does not exceed 10^2 cfu/g, and the total combined molds and yeasts count does not exceed 5×10^1 cfu/g.

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight containers, at controlled room temperature.
- **USP REFERENCE STANDARDS ⟨11⟩**
  USP Amoxicillin RS
  USP Clavulanate Lithium RS

Amoxicillin and Clavulanate Potassium Tablets

DEFINITION

Amoxicillin and Clavulanate Potassium Tablets contain the equivalent of NLT 90.0% and NMT 120.0% of the labeled amounts of amoxicillin ($C_{16}H_{19}N_3O_5S$) and clavulanic acid ($C_8H_9NO_5$).

IDENTIFICATION

- The retention times of the major peaks of the *Sample solution* correspond to those of the *Standard solution*, as obtained in the *Assay*.

ASSAY

- **PROCEDURE**

Buffer: 7.8 g of monobasic sodium phosphate in 900 mL of water. Adjust with phosphoric acid or 10 N sodium hydroxide to a pH of 4.4 ± 0.1, and dilute with water to 1000 mL.