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Stavudine Capsules

DEFINITION
Stavudine Capsules contain NLT 90.0% and NMT 105.0% of the labeled amount of stavudine ($C_{10}H_{12}N_2O_4$).

IDENTIFICATION

Change to read:

• **A.** ▲The UV spectrum of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.▲2S *(USP41)*

• **B.** 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**

All solutions containing stavudine must be prepared immediately before use and remain refrigerated until use.

Solution A: 0.77 g/L of ammonium acetate in water

Mobile phase: Acetonitrile and *Solution A* (5:95)

System suitability solution: 0.1 µg/mL each of ▲USP Zidovudine Related Compound C RS▲2S *(USP41)* and ▲USP Zidovudine Related Compound D RS▲2S *(USP41)* in water

Standard solution: 0.1 mg/mL of USP Stavudine RS in water. Use sonication to dissolve before dilution.

Sample solution: Nominally 0.1 mg/mL of stavudine prepared as follows. Open NLT 3 Capsules, and dissolve the contents in water. Dilute with water to obtain the final concentration.

Chromatographic system

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

Mode: LC

Detector: UV 268 nm. ▲For *Identification A*, use a diode array detector in the range of 190–400 nm.▲2S *(USP41)*

Column: 4.6-mm × 3.3-cm; ▲3-µm▲2S *(USP41)* packing L1

Flow rate: 0.7 mL/min

Injection volume: 20 µL

System suitability

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

[Note—The retention time of the stavudine peak in the *Standard solution* is between 2.8 and 5.0 min.]

Suitability requirements

Resolution: NLT 2.0 between ▲zidovudine related compound C▲2S *(USP41)* and ▲zidovudine related compound D; zidovudine related compound C▲2S *(USP41)* is resolved from the void volume, *System suitability solution*

▲▲2S *(USP41)*

Tailing factor: NMT 1.8, *Standard solution*

Relative standard deviation: NMT 2.0%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of stavudine ($C_{10}H_{12}N_2O_4$) in the portion of Capsules 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 Stavudine RS in the *Standard solution* (mg/mL)

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

Acceptance criteria: 90.0%–105.0%

PERFORMANCE TESTS

Change to read:

• **Dissolution** ⟨711⟩

Medium: Water; 900 mL

Apparatus 2: 75 rpm

Time: 30 min

Solution A and **Mobile phase:** Prepare as directed in the *Assay*.

Sample solution: ▲Dilute with *Medium* to a concentration that is similar to the *Standard solution*.▲2S *(USP41)*

Standard solution: USP Stavudine RS in *Medium* with a concentration corresponding to that of the *Sample solution*

Chromatographic system

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

Mode: LC

Detector: UV 254 nm

Column: 4.6-mm × 3.3-cm; ▲3-µm▲2S *(USP41)* packing L1

Flow rate: 0.7 mL/min

Injection volume: 10 µL

System suitability

Sample: *Standard solution*

Suitability requirements

▲▲2S *(USP41)*

Tailing factor: NMT 2

Relative standard deviation: NMT 2.0%

Analysis

Samples: *Sample solution* and *Standard solution*

Determine the percentage of the labeled amount of stavudine ($C_{10}H_{12}N_2O_4$) dissolved, using the procedure set forth in the *Assay*, making any necessary modifications.

Tolerances: NLT 80% (*Q*) of the labeled amount of stavudine ($C_{10}H_{12}N_2O_4$) is dissolved.

• **Uniformity of Dosage Units** ⟨905⟩**:** Meet the requirements

IMPURITIES

Change to read:

• **Organic Impurities**

Solution A, Mobile phase, System suitability solution, and **Sample solution:** Prepare as directed in the *Assay*.

Standard solution: 0.001 mg/mL of ▲USP Zidovudine Related Compound C RS.▲2S *(USP41)* Use sonication to dissolve before dilution.

Chromatographic system

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

Mode: LC

Detector: UV 268 nm

Column: 4.6-mm × 3.3-cm; ▲3-µm▲2S *(USP41)* packing L1

Flow rate: 0.7 mL/min

Injection volume: 20 µL

Run time: ▲NLT▲2S *(USP41)* 2.5 times the retention time of the stavudine peak

System suitability

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

[NOTE—The retention time of the stavudine peak in the *Standard solution* is between 2.8 and 5.0 min.]

Suitability requirements

Resolution: NLT 2.0 between ▲zidovudine related compound C▲2S *(USP41)* and ▲zidovudine related compound D; zidovudine related compound C▲2S *(USP41)* is resolved from the void volume, *System suitability solution*

▲▲2S *(USP41)*

Tailing factor: NMT 1.8, *Standard solution*

Relative standard deviation: NMT 3.0%, *Standard solution*

Analysis

Samples: *Sample solution* and *Standard solution*

Calculate the percentage of ▲zidovudine related compound C▲2S *(USP41)* in the portion of Capsules taken:

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

r_U = peak response of ▲zidovudine related compound C▲2S *(USP41)* from the *Sample solution*

r_S = peak response of ▲zidovudine related compound C▲2S *(USP41)* from the *Standard solution*

C_S = concentration of ▲USP Zidovudine Related Compound C RS▲2S *(USP41)* in the *Standard solution* (mg/mL)

C_U = nominal concentration of ▲stavudine▲2S *(USP41)* in the *Sample solution* (mg/mL)

Calculate the percentage of unknown impurities, not including ▲zidovudine related compound C,▲2S *(USP41)* in the portion of Capsules taken:

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

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

r_T = sum of all the peak responses from the *Sample solution*

Acceptance criteria: See *Table 1*. The disregard threshold is 0.05% of the total sample related peak response.

Table 1

Name	Acceptance Criteria, NMT (%)
▲Zidovudine related compound C[a]▲2S *(USP41)*	1.0
Any other individual impurity	0.2
Total impurities[b]	2.0

▲[a] 5-Methylpyrimidine-2,4-(1*H*,3*H*)-dione.▲2S *(USP41)*

[b] Includes ▲zidovudine related compound C.▲2S *(USP41)*

SPECIFIC TESTS

• **OPTICAL ROTATION** ⟨781S⟩, *Procedures, Specific Rotation*

Sample solution: Nominally 10 mg/mL of stavudine in water. Disperse a sufficient quantity of Capsule contents, equivalent to 200 mg of stavudine, in 50 mL of acetone. Bring to a boil, and pass through a fine-porosity filter. Precipitate the stavudine with 150 mL of heptane, filter the crystals, wash with heptane, and dry in air.

Acceptance criteria: −40° to −45°

• **WATER DETERMINATION** ⟨921⟩, *Method I*: NMT 3.5%

ADDITIONAL REQUIREMENTS

• **PACKAGING AND STORAGE:** Preserve in tightly closed containers, and store at controlled room temperature.

Change to read:

• **USP Reference Standards** ⟨11⟩

USP Stavudine RS

▲ USP Zidovudine Related Compound C RS

Thymine;
5-Methylpyrimidine-2,4(1*H*,3*H*)-dione.
$C_5H_6N_2O_2$ 126.11

USP Zidovudine Related Compound D RS

Thymidine;
[1-(2-Deoxy-β-D-ribofuranosyl)]thymine.
$C_{10}H_{14}N_2O_5$ 242.23▲2S *(USP41)*

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

Topic/Question	Contact	Expert Committee
STAVUDINE CAPSULES	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

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