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Zidovudine Tablets

DEFINITION

Zidovudine Tablets contain NLT 90.0% and NMT 110.0% of the labeled amount of zidovudine ($C_{10}H_{13}N_5O_4$).

IDENTIFICATION

- **A. Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*: 197K**

  Sample: Grind 1 Tablet in a mortar so that no large pieces remain, and remove the coating film so that about 5 mg of ground Tablet remain.

  Acceptance criteria: Meet the requirements

- **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

- **Procedure**

  Mobile phase: Dissolve 3.0 g of sodium acetate and 1.3 g of sodium 1-octane sulfonate in 900 mL of water. Add 90 mL of methanol and 40 mL of acetonitrile. Adjust with glacial acetic acid to a pH of 5.3.

  Zidovudine related compound B standard stock solution: 0.1 mg/mL of USP Zidovudine Related Compound B RS in methanol

  Zidovudine related compound C standard stock solution: 0.2 mg/mL of USP Zidovudine Related Compound C RS in methanol prepared as follows. Dissolve by sonicating for 15 min before bringing the solution to volume.

  Standard solution: 0.12 mg/mL of USP Zidovudine RS, 1 µg/mL of USP Zidovudine Related Compound B RS, and 4 µg/mL of USP Zidovudine Related Compound C RS prepared as follows. Transfer 30 mg of USP Zidovudine RS to a 250-mL volumetric flask, and dissolve in 3.0 mL of methanol. Add 2.5 mL of *Zidovudine related compound B standard stock solution* and 5.0 mL of *Zidovudine related compound C standard stock solution*, and dilute with water to volume.

  Sample stock solution: Nominally 3 mg/mL of zidovudine prepared as follows. Transfer a number of Tablets, equivalent to 1500 mg of zidovudine, to a 500-mL volumetric flask. Add 50 mL of water, and shake by mechanical means for 30 min to disperse the Tablets. Add 150 mL of methanol, and sonicate for 10 min. Dilute with water to volume.

  Sample solution: Nominally 0.12 mg/mL of zidovudine in water from *Sample stock solution*. Pass the solution through a nylon filter, discarding the first 2 mL of the filtrate.

  Chromatographic system

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

  Mode: LC

  Detector: UV 265 nm

  Column: 4.6-mm × 15-cm; packing L1

  Flow rate: 1.3 mL/min

  Injection volume: 20 µL

  System suitability

  Sample: *Standard solution*

  [Note—The relative retention times for zidovudine related compound C, zidovudine, and zidovudine related compound B are about 0.17, 1.0, and 1.2, respectively.]

  Suitability requirements

  Resolution: NLT 2.5 between the zidovudine and zidovudine related compound B peaks

  Tailing factor: NMT 2.0 for the zidovudine peak

  Relative standard deviation: NMT 2.0% for the zidovudine peak

  Analysis

  Samples: *Standard solution* and *Sample solution*

  Calculate the percentage of the labeled amount of zidovudine ($C_{10}H_{13}N_5O_4$) in the portion of Tablets 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 Zidovudine RS in the *Standard solution* (mg/mL)

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

Acceptance criteria: 90.0%–110.0%

PERFORMANCE TESTS

• **Dissolution** ⟨711⟩

Medium: Water; 900 mL

Apparatus 2: 50 rpm

Time: 30 min

Standard solution: Prepare a solution having a known concentration of USP Zidovudine RS in *Medium*

Sample solution: A filtered portion of the solution under test suitably diluted with *Medium*

Analysis:

Samples: *Standard solution* and *Sample solution*

Determine the percentage of zidovudine ($C_{10}H_{13}N_5O_4$) dissolved by using the procedure set forth in the *Assay*.

Tolerances: NLT 80% (*Q*) of the labeled amount of $C_{10}H_{13}N_5O_4$ is dissolved.

Change to read:

• **Uniformity of Dosage Units** ⟨905⟩**:** ▲Meet the requirements▲ (CN 1-Aug-2023)

Procedure for content uniformity

Mobile phase: Methanol and water (1:4)

Standard solution: Proceed as directed in the *Assay*.

Sample solution: Transfer 1 Tablet to a 100-mL volumetric flask, add 20 mL of water, and shake by mechanical means to disperse the Tablet. Add 30 mL of methanol, and sonicate for 10 min. Dilute with water to volume. Pipet 4.0 mL of the resulting solution into a 100-mL volumetric flask, and dilute with water to volume. Pass a portion of the solution through a suitable nylon filter, discarding the first 2 mL of the filtrate.

Chromatographic system

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

Mode: LC

Detector: UV 265 nm

Column: 4.6-mm × 15-cm; base-deactivated packing L1

Flow rate: 2 mL/min

Injection volume: 10 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 2.0 for the zidovudine peak

Relative standard deviation: NMT 2.0% for the zidovudine peak

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of zidovudine ($C_{10}H_{13}N_5O_4$), based on the label claim, in the portion of Tablet taken:

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

r_U = peak response of zidovudine from the *Sample solution*

r_S = peak response of zidovudine from the *Standard solution*

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

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

▲▲ (CN 1-Aug-2023)

IMPURITIES

• **Organic Impurities**

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

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of each impurity in the portion of Tablets taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (1/F) \times 100$$

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

r_S = peak response of zidovudine from the *Standard solution*

C_S = concentration of USP Zidovudine RS in the Standard solution (mg/mL)

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

F = relative response factor (see *Table 1*)

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Zidovudine related compound C	0.17	1.7	1.5
Zidovudine	1.00	—	—
Zidovudine related compound B[a]	1.2	—	—
Any other individual unidentified impurity	—	1.0	0.2
Total impurities	—	—	2.0

[a] Process impurity. Included for identification purpose only. Not to be included in the *Total impurities*.

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in tight, light-resistant containers, and store at controlled room temperature.

• **USP Reference Standards** ⟨11⟩

USP Zidovudine RS

USP Zidovudine Related Compound B RS

3'-Chloro-3'-deoxythymidine.

$C_{10}H_{13}ClN_2O_4$ 260.68

USP Zidovudine Related Compound C RS

Thymine.

$C_5H_6N_2O_2$ 126.12

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

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