Status: Currently Official on 17-Feb-2025
Official Date: Official as of 01-May-2022
Document Type: USP Monographs
DocId: GUID-FD764B8C-D819-4D50-B7C3-3C3BD478D310_2_en-US
DOI: https://doi.org/10.31003/USPNF_M89518_02_01
DOI Ref: fi76n

Zidovudine Oral Solution

DEFINITION
Zidovudine Oral Solution contains NLT 90.0% and NMT 110.0% of the labeled amount of zidovudine ($C_{10}H_{13}N_5O_4$).

IDENTIFICATION

Change to read:

• **▲A.▲** (USP 1-MAY-2022) The retention time of the zidovudine peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

Add the following:

▲• B. The UV spectrum of the zidovudine peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.▲ (USP 1-May-2022)

ASSAY

Change to read:

• **PROCEDURE**

Mobile phase: Methanol, acetonitrile, glacial acetic acid, and 0.040 M sodium acetate (90:10:2:900)

Standard stock solution: 1 mg/mL of USP Zidovudine RS in *Mobile phase*

Zidovudine related compound C stock solution: 0.1 mg/mL of USP Zidovudine Related Compound C RS in *Mobile phase*. [NOTE—Sonicate for 10 min before making final volume.]

Standard solution: Transfer 10.0 mL of the *Standard stock solution* and 2.0 mL of *Zidovudine related compound C stock solution* to a 100-mL volumetric flask. Dilute with *Mobile phase* to volume.

Sample solution: Nominally 0.1 mg/mL of zidovudine in *Mobile phase*

Chromatographic system

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

Mode: LC

Detector: UV 240 nm. ▲For *Identification B*, use a diode array detector in the range of 200–400 nm.▲ (USP 1-May-2022)

Column: 4.0-mm × 12.5-cm; packing L1

Flow rate: 1 mL/min

Injection volume: 10 µL

System suitability

Sample: *Standard solution*

[NOTE—The relative retention times for zidovudine related compound C and zidovudine are about 0.12 and 1.0, respectively.]

Suitability requirements

Resolution: NLT 4.0 between zidovudine and zidovudine related compound C

Tailing factor: NMT 2.0

Relative standard deviation: NMT 2.0%

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 Oral Solution 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%

IMPURITIES

Change to read:

[Note—On the basis of ▲knowledge of the product,▲ (USP 1-May-2022) perform either *Organic Impurities, Procedure 1* or *Procedure 2*.]

• **Organic Impurities, Procedure 1**

Mobile phase, Standard stock solution, Zidovudine related compound C solution, 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 zidovudine related compound C in the portion of Oral Solution 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 Related Compound C RS in the *Standard solution* (mg/mL)

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

Acceptance criteria: NMT 3.0%

Change to read:

• **Organic Impurities, Procedure 2**

Buffer: 5.44 mg/mL of sodium acetate trihydrate in water. Pass the solution through a suitable filter of 0.45-µm pore size.

Mobile phase: Methanol, acetonitrile, glacial acetic acid, and *Buffer* (50:10:2:940)

Impurity stock solution: 0.625 mg/mL of USP Zidovudine Related Compound C RS, 0.375 mg/mL of thymidine, 0.375 mg/mL of USP Stavudine RS, and 0.25 mg/mL of USP Zidovudine Related Compound B RS dissolved initially with methanol at 25% of the final volume. Dilute with *Mobile phase* to final volume. [Note—Sonicate with intermittent shaking to dissolve, if necessary, and cool to room temperature before diluting to final volume.]

Impurity solution: 0.05 mg/mL of USP Zidovudine Related Compound C RS, 0.03 mg/mL of thymidine, 0.03 mg/mL of USP Stavudine RS, and 0.02 mg/mL of USP Zidovudine Related Compound B RS in *Mobile phase* from the *Impurity stock solution*

System suitability solution: 1 mg/mL of USP Zidovudine RS, 0.005 mg/mL of USP Zidovudine Related Compound C RS, 0.003 mg/mL of thymidine, 0.003 mg/mL of USP Stavudine RS, and 0.002 mg/mL of USP Zidovudine Related Compound B RS in *Mobile phase* from USP Zidovudine RS and the *Impurity solution*

Standard stock solution: 0.25 mg/mL of USP Zidovudine RS in *Mobile phase*. Sonicate to dissolve, if necessary.

Standard solution: 0.002 mg/mL of USP Zidovudine RS in *Mobile phase* from the *Standard stock solution*

Sample solution: Nominally 1 mg/mL of zidovudine in *Mobile phase*

Chromatographic system

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

Mode: LC

Detector: UV 240 nm

Column: 4.6-mm × 10-cm; 3-µm packing L1

Column temperature: 25°

Flow rate: 1.5 mL/min

Injection volume: 20 µL

System suitability

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

[Note—See *Table 1* for relative retention times.]

Suitability requirements

Resolution: NLT 1.4 between zidovudine and zidovudine related compound B, *System suitability solution*

Tailing factor: NMT 2.0, *Standard solution*

Relative standard deviation: NMT 5.0%, ▲*Standard solution*▲ (USP 1-May-2022)

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of each individual impurity in the portion of Oral Solution taken:

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

r_U = peak response of each individual 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 for each individual impurity (see *Table 1*)

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
▲3'-Amino-3'-deoxythymidine	0.07	1.0	1.5▲ (USP 1-May-2022)
Zidovudine related compound C	0.08	1.9	3.0
▲Thymidine▲ (USP 1-May-2022) [a]	0.14	1.0	0.30
Stavudine[b]	0.27	1.0	0.30
Zidovudine	1.00	—	—
Zidovudine related compound B	1.22	1.0	0.20
Individual unspecified impurity	—	1.0	0.20
Total impurities[c]	—	—	2.0

[a] [1-(2-Deoxy-β- D-ribofuranosyl)]thymine.

[b] ▲1-(2,3-Dideoxy-β-D-glyceropent-2-enofuranosyl)thymine.▲ (USP 1-May-2022)

[c] Excludes zidovudine related compound C.

SPECIFIC TESTS

Change to read:

• **Microbial Enumeration Tests ⟨61⟩** and **Tests for Specified Microorganisms ⟨62⟩:** ▲The total aerobic microbial count is NMT 10^2 cfu/mL, and the total yeasts and molds count is NMT 10^1 cfu/mL.▲ (USP 1-May-2022) Meets the requirements of the tests for absence of *Salmonella* species, *Escherichia coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*.

• **pH ⟨791⟩**

Sample: A mixture containing a volume of Oral Solution equivalent to 150 mg of zidovudine and 5 mL of 0.12 M potassium chloride (3:1)

Acceptance criteria: 3.0–4.0

PERFORMANCE TESTS

• **Deliverable Volume** ⟨698⟩

For multiple-unit containers: Meets the requirements

• **Uniformity of Dosage Units** ⟨905⟩

For single-unit containers: Meets the requirements

ADDITIONAL REQUIREMENTS

Change to read:

• **Packaging and Storage:** Preserve in tight, light-resistant containers. ▲Store at controlled room temperature.▲ (USP 1-May-2022)

• **Labeling:** If a test for *Organic Impurities* other than *Procedure 1* is used, then the labeling states with which *Organic Impurities* test the article complies.

Change to read:

• **USP Reference Standards** ⟨11⟩

USP Stavudine RS

USP Zidovudine RS

USP Zidovudine Related Compound B RS

3'-Chloro-3'-deoxythymidine.

$C_{10}H_{13}ClN_2O_4$ ▲260.67▲ (USP 1-May-2022)

USP Zidovudine Related Compound C RS

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

$C_5H_6N_2O_2$ ▲126.11▲ (USP 1-May-2022)

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

Topic/Question	Contact	Expert Committee
ZIDOVUDINE ORAL SOLUTION	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. 45(2)

Current DocID: GUID-FD764B8C-D819-4D50-B7C3-3C3BD478D310_2_en-US

DOI: https://doi.org/10.31003/USPNF_M89518_02_01

DOI ref: fi76n