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Lamivudine Oral Solution

DEFINITION

Lamivudine Oral Solution contains NLT 90.0% and NMT 110.0% of the labeled amount of lamivudine ($C_8H_{11}N_3O_3S$). It may contain a suitable preservative.

IDENTIFICATION

• **A.** The retention time of the lamivudine peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

ASSAY

Change to read:

• **Procedure**

Solution A: 2.0 g/L of sodium heptanesulfonate in water. Add 1.0 mL of hydrochloric acid and 1.0 mL of triethylamine per L of the solution.

Solution B: Acetonitrile and *Solution A* (50:50)

Mobile phase: See *Table 1*.

Table 1

Time (min)	Solution A (%)	Solution B (%)
0	100	0
20	60	40
30	10	90
33	10	90
34	100	0
45	100	0

Diluent: Acetonitrile and water (10:90)

System suitability solution: Dissolve the contents of 1 vial of USP Lamivudine Resolution Mixture C RS in 2.5 mL of *Diluent*.

Standard solution: 0.2 mg/mL of USP Lamivudine RS in *Diluent*

Sample solution: Nominally 0.2 mg/mL of lamivudine in water

Chromatographic system

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

Mode: LC

Detector: UV 277 nm

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

Flow rate: ▲1 mL/min▲ (ERR 1-Jun-2018)

Injection volume: 10 µL

System suitability

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

Suitability requirements

Resolution: NLT 1.5 between lamivudine-*S*-sulfoxide and lamivudine-*R*-sulfoxide, *System suitability solution*

Tailing factor: NMT 2.0 for the lamivudine peak, *System suitability solution*

Relative standard deviation: NMT 2% for the lamivudine peak, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of lamivudine ($C_8H_{11}N_3O_3S$) in the portion of Oral Solution taken:

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

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

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

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

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

Acceptance criteria: 90.0%–110.0%

PERFORMANCE TESTS

• **Deliverable Volume ⟨698⟩:** Meets the requirements

IMPURITIES

• **Organic Impurities**

Solution A, Solution B, Mobile phase, Diluent, System suitability solution, Sample solution, Chromatographic system, and **System suitability:** Proceed as directed in the *Assay*.

Analysis

Sample: *Sample solution*

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

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

r_U = peak response of each individual impurity

r_S = sum of the responses of all of the peaks excluding peaks due to added preservative(s) or excipients

Acceptance criteria: See *Table 2*.

Table 2

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Lamivudine-uracil derivative[a]	0.34	1.2
Cytosine[b]	0.52	0.3
Lamivudine-*S*-sulfoxide[c]	0.61	0.3
Lamivudine-*R*-sulfoxide[d]	0.63	0.6
Lamivudine carboxylic acid[e,f]	0.89	—
Lamivudine *trans*[f,g]	0.94	—
Lamivudine	1.0	—
Salicylic acid[f]	1.38	—
Any other identified impurity	—	0.3
Any individual unidentified impurity	—	0.2
Total impurities	—	2.0

[a] 1-[(2*R*,5*S*)-2-(Hydroxymethyl)-1,3-oxathiolan-5-yl]uracil.

[b] 4-Aminopyrimidin-2(1*H*)-one.

[c] 1-[(2*R*,3*S*,5*S*)-2-(Hydroxymethyl)-1,3-oxathiolan-5-yl]cytosine *S*-oxide.

[d] 1-[(2*R*,3*R*,5*S*)-2-(Hydroxymethyl)-1,3-oxathiolan-5-yl]cytosine *S*-oxide.

[e] (2*RS*,5*SR*)-5-(Cytosine-1-yl)-1,3-oxathiolane-2-carboxylic acid.

[f] This impurity is controlled in the drug substance and is not to be included in the total impurities. Disregard any peak less than 0.01%.

[g] 1-[(2*S*,5*S*)-2-(Hydroxymethyl)-1,3-oxathiolan-5-yl]cytosine.

SPECIFIC TESTS

• **pH ⟨791⟩:** 5.7–6.3

• **Microbial Enumeration Tests ⟨61⟩** and **Tests for Specified Microorganisms ⟨62⟩:** The total aerobic microbial count does not exceed 10^2 cfu/mL. The total molds and yeasts count does not exceed 10^2 cfu/mL. It meets the requirements of the test for absence of *Escherichia coli*.

ADDITIONAL REQUIREMENTS

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

• **USP Reference Standards ⟨11⟩**

USP Lamivudine RS

USP Lamivudine Resolution Mixture C RS

[Note—This reference standard contains lamivudine and several related impurities.]

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

Topic/Question	Contact	Expert Committee
LAMIVUDINE ORAL SOLUTION	Documentary Standards Support	SM12020 Small Molecules 1

Chromatographic Database Information: Chromatographic Database

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