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Sumatriptan Tablets

DEFINITION
Sumatriptan Tablets contain NLT 90.0% and NMT 110.0% of the labeled amount of sumatriptan ($C_{14}H_{21}N_3O_2S$).

IDENTIFICATION

Change to read:

• **A.** ▲**Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*: 197K.**▲ (CN 1-May-2020) The IR spectrum exhibits main bands at or near (±1) wavenumbers (cm^{-1}) 1708, 1567, 1339, 1300, 1235, 1207, 989, and 844.

• **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**

Buffer solution A: 2.9 g/L of monobasic sodium phosphate, 1.3 mL/L of dibutylamine, and 0.4 mL/L of phosphoric acid in water. Adjust with 10 N sodium hydroxide to a pH of 6.5.

Buffer solution B: 3.9 g/L of monobasic sodium phosphate. Adjust with 10 N sodium hydroxide to a pH of 6.5 before dilution.

Mobile phase: Acetonitrile and *Buffer solution A* (1:3)

Diluent: Acetonitrile and *Buffer solution B* (1:3)

Standard solution: Equivalent to 0.1 mg/mL of sumatriptan from USP Sumatriptan Succinate RS in *Diluent*

Sample stock solution: Nominally 1–2 mg/mL of sumatriptan from NLT 5 Tablets prepared as follows. Transfer the Tablets to a suitable volumetric flask. Add *Diluent* to fill 60%–80% of the flask volume. Sonicate for 15–20 min with intermittent shaking. Dilute with *Diluent* to volume.

Sample solution: Nominally 0.1 mg/mL of sumatriptan in *Diluent* from the *Sample stock solution*. Pass through a suitable filter of 0.45-µm pore size.

Chromatographic system

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

Mode: LC

Detector: UV 282 nm

Column: 4.6-mm × 25-cm; 5-µm packing L1

Flow rate: 1.5 mL/min

Injection volume: 10 µL

Run time: NLT 1.7 times the retention time of sumatriptan

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 2.0

Relative standard deviation: NMT 1.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of sumatriptan ($C_{14}H_{21}N_3O_2S$) in the portion of Tablets taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (M_{r1}/M_{r2}) \times 100$$

r_U = peak response from the *Sample solution*

r_S = peak response from the *Standard solution*

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

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

M_{r1} = molecular weight of sumatriptan, 295.4

M_{r2} = molecular weight of sumatriptan succinate, 413.5

Acceptance criteria: 90.0%–110.0%

PERFORMANCE TESTS

• **Dissolution ⟨711⟩**

Test 1

Medium: 0.01 N hydrochloric acid; 900 mL

Apparatus 2: 30 rpm

Time: 15 min

Standard solution: 0.025 mg/mL of USP Sumatriptan Succinate RS in *Medium*

Sample solution: Pass a portion of the solution under test through a suitable filter of 0.45-µm pore size. Dilute with *Medium* if necessary.

Instrumental conditions

Mode: UV

Detector: about 282 nm

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of sumatriptan ($C_{14}H_{21}N_3O_2S$) dissolved:

$$\text{Result} = (A_U/A_S) \times C_S \times V \times D \times (M_{r1}/M_{r2}) \times (1/L) \times 100$$

A_U = absorbance of the *Sample solution*

A_S = absorbance of the *Standard solution*

C_S = concentration of the *Standard solution* (mg/mL)

V = volume of *Medium*, 900 mL

D = dilution factor

M_{r1} = molecular weight of sumatriptan, 295.4

M_{r2} = molecular weight of sumatriptan succinate, 413.5

L = label claim (mg/Tablet)

Tolerances: NLT 80% (Q) of the labeled amount of sumatriptan is dissolved.

Test 2: If the product complies with this test, the labeling indicates that it meets USP *Dissolution Test 2*.

Medium: 0.01 N hydrochloric acid; 900 mL

Apparatus 2: 50 rpm

Time: 15 min

Standard solution: (L/900) mg/mL of USP Sumatriptan Succinate RS in *Medium*, where L is the Tablet label claim in mg

Sample solution: Pass a portion of the solution under test through a suitable filter of 0.45-µm pore size.

Instrumental conditions

Mode: UV

Detector: About 282 nm

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of sumatriptan ($C_{14}H_{21}N_3O_2S$) dissolved:

$$\text{Result} = (A_U/A_S) \times C_S \times V \times (M_{r1}/M_{r2}) \times (1/L) \times 100$$

A_U = absorbance of the *Sample solution*

A_S = absorbance of the *Standard solution*

C_S = concentration of the *Standard solution* (mg/mL)

V = volume of *Medium*, 900 mL

M_{r1} = molecular weight of sumatriptan, 295.4

M_{r2} = molecular weight of sumatriptan succinate, 413.5

L = label claim (mg/Tablet)

Tolerances: NLT 80% (Q) of the labeled amount of sumatriptan is dissolved.

Test 3: If the product complies with this test, the labeling indicates that it meets USP *Dissolution Test 3*.

Medium: 0.01 N hydrochloric acid; 900 mL

Apparatus 2: 50 rpm

Time: 30 min

Standard solution: 0.035 mg/mL of USP Sumatriptan Succinate RS in *Medium*

Sample solution: Dilute the solution if necessary and pass a portion of the solution under test through a suitable filter of 0.45-µm pore size.

Instrumental conditions

Mode: UV

Detector: About 283 nm

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of sumatriptan ($C_{14}H_{21}N_3O_2S$) dissolved:

$$\text{Result} = (A_U/A_S) \times C_S \times V \times D \times (M_{r1}/M_{r2}) \times (1/L) \times 100$$

A_U = absorbance of the *Sample solution*

A_S = absorbance of the *Standard solution*

C_S = concentration of the *Standard solution* (mg/mL)

V = volume of *Medium*, 900 mL

D = dilution factor

M_{r1} = molecular weight of sumatriptan, 295.4

M_{r2} = molecular weight of sumatriptan succinate, 413.5

L = label claim (mg/Tablet)

Tolerances: NLT 75% (Q) of the labeled amount of sumatriptan is dissolved.

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

IMPURITIES

• **Organic Impurities**

Diluent: 0.1 N hydrochloric acid

Buffer: 1.9 g/L of ammonium acetate. Adjust with acetic acid to a pH of 4.1.

Solution A: Acetonitrile and methanol (90:10)

Solution B: *Solution A* and *Buffer* (5:95)

Solution C: *Solution A* and *Buffer* (22:78)

Mobile phase: See *Table 1*.

Table 1

Time (min)	Solution B (%)	Solution C (%)
0	100	0

Time (min)	Solution B (%)	Solution C (%)
14.5	100	0
21	0	100
28	0	100
29	100	0
37	100	0

System suitability solution: 0.1 mg/mL each of USP Sumatriptan Succinate RS and USP Sumatriptan Succinate Related Compound C RS in *Diluent*

Sensitivity solution: 0.7 µg/mL of USP Sumatriptan Succinate Related Compound C RS in *Diluent*

Sample solution: Nominally 1.25 mg/mL of sumatriptan from NLT 5 Tablets in *Diluent* prepared as follows. Transfer the Tablets to a suitable volumetric flask. Add *Diluent* to fill 80% of the flask volume. Sonicate for 5 min to disperse the Tablets completely. Allow to cool to room temperature for NLT 15 min. Dilute with *Diluent* to volume. Centrifuge a portion of the solution at NLT 3000 RM for 10 min. Alternatively, the *Sample solution* may be filtered using a suitable filter. Use the supernatant or filtrate.

Chromatographic system

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

Mode: LC

Detector: UV 282 nm

Column: 4.6-mm × 25-cm; 5-µm packing L1

Column temperature: 50°

Flow rate: 2 mL/min

Injection volume: 20 µL

System suitability

Samples: *System suitability solution* and *Sensitivity solution*

Suitability requirements

Resolution: NLT 1.5 between sumatriptan and sumatriptan succinate related compound C, *System suitability solution*

Signal-to-noise ratio: NLT 10, *Sensitivity solution*

Analysis

Sample: *Sample solution*

Calculate the percentage of each impurity as well as any individual unspecified degradation product in the portion of Tablets taken:

$$\text{Result} = (r_U/r_T) \times (1/F) \times 100$$

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

r_T = sum of peak responses for all peaks in the *Sample solution*

F = relative response factor (see *Table 2*)

Acceptance criteria: See *Table 2*.

Table 2

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
3-Hydroxy-2-oxo sumatriptan[a]	0.23	0.40	0.5
Sumatriptan amino[b,c]	0.86	—	—

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Sumatriptan monomethyl[c,d]	0.98	—	—
Sumatriptan	1.0	—	—
Sumatriptan related compound C	1.22	1.0	0.5
Sumatriptan *N*-oxide[e]	1.56	1.0	0.5
Sumatriptan related compound A[f]	1.75	1.67	0.75
Sumatriptan *N*-dimer[g]	1.86	1.0	0.3
Any individual, unspecified degradation product	—	1.0	0.2
Total impurities	—	—	2.0

[a] 1-{3-[2-(Dimethylamino)ethyl]-3-hydroxy-2-oxoindolin-5-yl}-*N*-methylmethanesulfonamide.

[b] [3-[2-Aminoethyl)]-1*H*-indol-5-yl]-*N*-methylmethanesulfonamide.

[c] Process impurity, included for peak identification purposes only, controlled in the drug substance.

[d] *N*-Methyl-1-{3-[2-(methylamino)ethyl]-1*H*-indol-5-yl}methanesulfonamide.

[e] *N*-Methyl-1-{3-[2-(dimethylamino *N*-oxide)ethyl]-1*H*-indol-5-yl}methanesulfonamide.

[f] [3-[2-(Dimethylamino)ethyl]-2-[[3-[2-(dimethylamino)ethyl]-1*H*-indol-5-yl]methyl]-1*H*-indol-5-yl]-*N*-methylmethanesulfonamide.

[g] {3-[2-(Dimethylamino)ethyl]-1-({3-[2-(dimethylamino)ethyl]-1*H*-indol-5-yl}methyl)-1*H*-indol-5-yl}-*N*-methylmethanesulfonamide.

ADDITIONAL REQUIREMENTS

- **Packaging and Storage:** Preserve in well-closed containers. Store between 2° and 30°.
- **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 Sumatriptan Succinate RS

USP Sumatriptan Succinate Related Compound C RS

[3-[2-(Dimethylamino)ethyl]-1-(hydroxymethyl)-1*H*-indol-5-yl]-*N*-methylmethanesulfonamide succinate salt.

$C_{15}H_{23}N_3O_3S \cdot 0.5C_4H_6O_4$ 384.47

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

Topic/Question	Contact	Expert Committee
SUMATRIPTAN TABLETS	Documentary Standards Support	SM42020 Small Molecules 4
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM42020 Small Molecules 4

Chromatographic Database Information: Chromatographic Database

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