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Metronidazole Injection

DEFINITION

Metronidazole Injection is a sterile, isotonic, buffered solution of Metronidazole in Water for Injection. It contains NLT 90.0% and NMT 110.0% of the labeled amount of metronidazole ($C_6H_9N_3O_3$).

IDENTIFICATION

• **A.** The UV (UV-Vis) spectrum of the metronidazole peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

• **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: Methanol and water (20:80)

System suitability solution: 1 µg/mL of USP Metronidazole RS and 2 µg/mL of USP Tinidazole Related Compound A RS in *Mobile phase*

Standard solution: 0.03 mg/mL of USP Metronidazole RS in *Mobile phase*

Sample solution: Nominally 0.03 mg/mL of metronidazole in *Mobile phase* prepared as follows. Transfer a portion of Injection to a suitable volumetric flask, and dilute with *Mobile phase* to volume.

Chromatographic system

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

Mode: LC

Detector: UV 319 nm. For *Identification* test *A*, use a diode array detector in the range of 210–800 nm.

Column: 4.6-mm × 15-cm; 5-µm packing L7

Column temperature: 30°

Flow rate: 1 mL/min

Injection volume: 30 µL

System suitability

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

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

Suitability requirements

Resolution: NLT 4.0 between metronidazole and tinidazole related compound A, *System suitability solution*

Tailing factor: NMT 2.0, *Standard solution*

Relative standard deviation: NMT 1.0%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of metronidazole ($C_6H_9N_3O_3$) in the portion of Injection 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 Metronidazole RS in the *Standard solution* (mg/mL)

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

Acceptance criteria: 90.0%–110.0%

IMPURITIES

• **Organic Impurities**

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

Standard solution: 0.75 µg/mL each of USP Metronidazole RS and USP Tinidazole Related Compound A RS in *Mobile phase*

Sample solution: Nominally 500 µg/mL of metronidazole prepared as follows. Transfer a portion of Injection to a suitable volumetric flask. Add *Mobile phase* equivalent to 50% of the flask size. Sonicate for 2 min. Dilute with *Mobile phase* to volume, and pass a portion of the solution through a filter of 0.45-µm pore size. Use the filtrate.

System suitability

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

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

Suitability requirements

Resolution: NLT 4.0 between metronidazole and tinidazole related compound A, *System suitability solution*

Relative standard deviation: NMT 1.0%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of tinidazole related compound A in the portion of Injection taken:

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

r_U = peak response of tinidazole related compound A from the *Sample solution*

r_S = peak response of tinidazole related compound A from the *Standard solution*

C_S = concentration of USP Tinidazole Related Compound A RS in the *Standard solution* (µg/mL)

C_U = nominal concentration of metronidazole in the *Sample solution* (µg/mL)

Calculate the percentage of any individual unspecified impurity in the portion of Injection taken:

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

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

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

C_S = concentration of USP Metronidazole RS in the *Standard solution* (µg/mL)

C_U = nominal concentration of metronidazole in the *Sample solution* (µg/mL)

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Tinidazole related compound A	0.7	0.15
Metronidazole	1.0	—
Any individual unspecified degradation product	—	0.15
Total impurities	—	2.0

SPECIFIC TESTS

• **pH** ⟨791⟩**:** 4.5–7.0

• **Bacterial Endotoxins Test ⟨85⟩:** NMT 0.35 USP Endotoxin Units/mg of metronidazole

• **Particulate Matter in Injections ⟨788⟩:** It meets the requirements for small-volume injections.

• **Other Requirements:** It meets the requirements in *Injections and Implanted Drug Products ⟨1⟩*.

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in single-dose containers of Type I or Type II glass, or in suitable plastic containers, protected from light. Store at controlled room temperature.

• **USP Reference Standards ⟨11⟩**

USP Metronidazole RS

USP Tinidazole Related Compound A RS

2-Methyl-5-nitroimidazole.

$C_4H_5N_3O_2$ 127.10

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

Topic/Question	Contact	Expert Committee
METRONIDAZOLE INJECTION	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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