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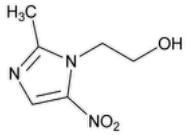
Metronidazole



$C_6H_9N_3O_3$ 171.15

1*H*-Imidazole-1-ethanol, 2-methyl-5-nitro-;

2-Methyl-5-nitroimidazole-1-ethanol CAS RN®: 443-48-1; UNII: 140QMO216E.

DEFINITION

Metronidazole contains NLT 99.0% and NMT 101.0% of metronidazole ($C_6H_9N_3O_3$), calculated on the dried basis.

IDENTIFICATION

Change to read:

• **A.** ▲**Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*: 197K.**▲ (CN 1-May-2020) Meets 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: Methanol and water (1:4)

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

Sample solution: 0.03 mg/mL of Metronidazole in *Mobile phase*

Chromatographic system

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

Mode: LC

Detector: UV 319 nm

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

Column temperature: 30°

Flow rate: 1 mL/min

Injection volume: 30 µL

Run time: Twice the retention time of metronidazole

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 2.0

Relative standard deviation: NMT 2.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of metronidazole ($C_6H_9N_3O_3$) in the portion of Metronidazole 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 = concentration of Metronidazole in the *Sample solution* (mg/mL)

Acceptance criteria: 99.0%–101.0% on the dried basis

IMPURITIES

• **Residue on Ignition ⟨281⟩:** NMT 0.1%

• **Organic Impurities**

Mobile phase and **Chromatographic system:** Proceed as directed in the *Assay*. The run time is 30 min.

Standard solution: 1 µg/mL of metronidazole from USP Metronidazole RS and 2 µg/mL of tinidazole related compound A from USP Tinidazole Related Compound A RS in *Mobile phase*

Sample solution: 1.0 mg/mL of Metronidazole in *Mobile phase*

System suitability

Sample: *Standard solution*

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

Suitability requirements

Resolution: NLT 2.0 between tinidazole related compound A and metronidazole

Tailing factor: NMT 2.0 for the metronidazole peak

Relative standard deviation: NMT 6.0% for both tinidazole related compound A and metronidazole; six replicate injections

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of tinidazole related compound A in the portion of Metronidazole 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* (mg/mL)

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

Calculate the percentage of any single unspecified impurity in the portion of Metronidazole taken:

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

r_U = peak response of any single 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* (mg/mL)

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

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Tinidazole related compound A	0.75	0.1
Metronidazole	1.00	—
Any single unspecified impurity	—	0.1
Total impurities	—	0.2

SPECIFIC TESTS

• **Loss on Drying ⟨731⟩**

Analysis: Dry at 105° for 2 h.

Acceptance criteria: NMT 0.5%

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in well-closed, light-resistant containers, and 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	Documentary Standards Support	SM12020 Small Molecules 1

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. PF 34(3)

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