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# Metronidazole Gel

**DEFINITION**
Metronidazole Gel contains NLT 90.0% and NMT 110.0% of the labeled amount of metronidazole ($C_6H_9N_3O_3$).

**IDENTIFICATION**
- **A.** The UV 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**

**Solution A:** Methanol and water (20:80)

**Solution B:** Methanol

**Mobile phase:** See *Table 1*.

**Table 1**

| Time (min) | Solution A (%) | Solution B (%) |
|---|---|---|
| 0 | 100 | 0 |
| 10.0 | 100 | 0 |
| 15.0 | 10 | 90 |
| 15.1 | 100 | 0 |
| 20.0 | 100 | 0 |

**System suitability solution:** 0.6 µg/mL of USP Metronidazole RS and 0.6 µg/mL of USP Tinidazole Related Compound A RS in *Solution A*

**Standard solution:** 30 µg/mL of USP Metronidazole RS in *Solution A*

**Sample stock solution:** Nominally 300 µg/mL of metronidazole in *Solution A* prepared as follows. Transfer a portion of Gel to a suitable volumetric flask. Add *Solution A* equivalent to 50% of the flask volume and sonicate or vortex until dissolved. Dilute with *Solution A* to volume. [Note—On the basis of formulation, if necessary, centrifuge a portion of the solution at 3000 rpm for 10 min and pass a portion of the supernatant through a filter of 0.45-µm pore size. Use the filtrate.]

**Sample solution:** Nominally 30 µg/mL of metronidazole in *Solution A* prepared from the *Sample stock solution*

**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 210–500 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 2* for the relative retention times.]

**Suitability requirements**

 

**Resolution:** NLT 2.0 between metronidazole and tinidazole related compound A, *System suitability solution*

**Tailing factor:** NMT 2.0, *Standard solution*

**Relative standard deviation:** NMT 2.0%, *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 Gel taken:

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

$r_U$ = peak response of metronidazole 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:** 90.0%–110.0%

## IMPURITIES

• **Organic Impurities**

**Solution A, Solution B, Mobile phase,** and **Chromatographic system:** Proceed as directed in the *Assay*.

**Standard solution:** Use the *System suitability solution* from the *Assay*.

**Sample solution:** Use the *Sample stock solution* from the *Assay*.

**System suitability**

**Sample:** *Standard solution*

[Note—See *Table 2* for the relative retention times.]

**Suitability requirements**

**Resolution:** NLT 2.0 between metronidazole and tinidazole related compound A

**Relative standard deviation:** NMT 2.0%

**Analysis**

**Samples:** *Standard solution* and *Sample solution*

Calculate the percentage of tinidazole related compound A in the portion of Gel 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 each individual unspecified impurity in the portion of Gel taken:

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

$r_U$ = peak response of 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 2*.

**Table 2**

 

| Name | Relative Retention Time | Acceptance Criteria, NMT (%) |
|---|---|---|
| Tinidazole related compound A | 0.76 | 0.2 |
| Metronidazole | 1.0 | — |
| Any individual unspecified impurity | — | 0.3 |
| Total impurities | — | 1.0 |

**PERFORMANCE TESTS**

• **Minimum Fill ⟨755⟩:** Meets the requirements

**SPECIFIC TESTS**

• **pH ⟨791⟩:** The apparent pH determined potentiometrically is between 4.0 and 6.5.

**ADDITIONAL REQUIREMENTS**

• **Packaging and Storage:** Preserve in laminated collapsible tubes 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 GEL | 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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