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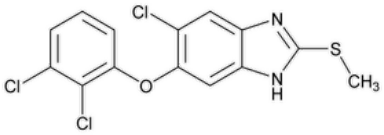
Add the following:

▲Triclabendazole



$C_{14}H_9Cl_3N_2OS$ 359.65

1*H*-Benzimidazole, 6-chloro-5-(2,3-dichlorophenoxy)-2-(methylthio)-; 5-Chloro-6-(2,3-dichlorophenoxy)-2-(methylthio)-1*H*-benzimidazole CAS RN®: 68786-66-3; UNII: 4784C8E03O.

DEFINITION

Triclabendazole contains NLT 99.0% and NMT 101.0% of triclabendazole ($C_{14}H_9Cl_3N_2OS$), calculated on the dried basis.

IDENTIFICATION

• **A. Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*:** 197K or 197A

• **B.** The retention time of the major peak of the *Sample solution* corresponds to that of the *Standard stock solution* as obtained in the test for *Organic Impurities*.

ASSAY

• **Procedure**

Sample solution: 5.6 mg/mL of Triclabendazole in glacial acetic acid. Sonicate if necessary to dissolve.

Titrant: 0.1 N perchloric acid

Analysis

Titrate with *Titrant*, determining the endpoint potentiometrically. Perform a blank determination and make any necessary correction (see *Titrimetry ⟨541⟩*).

Calculate the percentage of triclabendazole ($C_{14}H_9Cl_3N_2OS$) in the portion of Triclabendazole taken:

$$\text{Result} = \{[(V_S - V_B) \times N \times F]/W\} \times 100$$

V_S = sample titrant volume (mL)

V_B = blank titrant volume (mL)

N = actual normality of titrant (mEq/mL)

F = equivalency factor, 359.7 mg/mEq

W = sample weight (mg)

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

IMPURITIES

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

• **Organic Impurities**

Protect the solutions containing triclabendazole from light.

Buffer: 0.77 g/L of ammonium acetate in water prepared as follows. Dissolve 0.77 g of ammonium acetate in about 800 mL of water. Add 1 mL of triethylamine. Adjust with glacial acetic acid to a pH of 4.5 and dilute with water to volume.

Mobile phase: Acetonitrile and *Buffer* (54:46)

System suitability solution: 2 mg/mL of USP Triclabendazole RS and 0.012 mg/mL each of USP Triclabendazole Related Compound A RS, USP Triclabendazole Related Compound B RS, and USP Triclabendazole Related Compound D RS prepared as follows. To a suitable amount of USP Triclabendazole RS, USP Triclabendazole Related Compound A RS, USP Triclabendazole Related Compound B RS, and USP Triclabendazole Related Compound D RS add about 10% of the flask volume of acetonitrile to dissolve. Dilute with *Mobile phase* to final volume.

Standard stock solution: 2 mg/mL of USP Triclabendazole RS in *Mobile phase* prepared as follows. Transfer a suitable amount of Triclabendazole to a suitable volumetric flask and add about 40% of the flask volume of acetonitrile to dissolve. Dilute with *Mobile phase* to volume.

Standard solution: 0.004 mg/mL of USP Triclabendazole RS in *Mobile phase* from *Standard stock solution*

Sensitivity solution: 0.001 mg/mL of USP Triclabendazole RS in *Mobile phase* from *Standard solution*

Sample solution: 2 mg/mL of Triclabendazole prepared as follows. Transfer a suitable amount of Triclabendazole to a suitable volumetric flask and add about 40% of the flask volume of acetonitrile to dissolve. Dilute with *Mobile phase* to final volume.

Chromatographic system

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

Mode: LC

Detector: UV 305 nm

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

Flow rate: 1 mL/min

Injection volume: 20 µL

Run time: NLT 4.5 times the retention time of triclabendazole

System suitability

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

[NOTE—The relative retention times for triclabendazole related compound A, triclabendazole related compound B, and triclabendazole are 0.55, 0.63, and 1.0 respectively.]

Suitability requirements

Resolution: NLT 1.5 between triclabendazole related compound A and triclabendazole related compound B, *System suitability solution*

Relative standard deviation: NMT 5.0%, *Standard solution*

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

Analysis

Samples: *Standard solution and Sample solution*

Calculate the percentage of any individual impurity in the portion of Triclabendazole taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (1/F) \times 100$$

r_U = peak response of any individual impurity from the *Sample solution*

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

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

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

F = relative response factor (see *Table 1*)

Acceptance criteria: See *Table 1*. The reporting threshold is 0.05%.

Table 1

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Triclabendazole related compound A	0.55	0.53	0.3
Triclabendazole	1.0	—	—

Name	Relative Retention Time	Relative Response Factor	Acceptance Criteria, NMT (%)
Triclabendazole related compound D	2.0	0.37	0.15
Any individual unspecified impurity	—	1.0	0.10
Total impurities	—	—	1.0

ADDITIONAL REQUIREMENTS

• **Loss on Drying** ⟨731⟩

Analysis: Dry the sample at 105°–110° for 6 h under vacuum.

Acceptance criteria: NMT 0.5%

• **Packaging and Storage:** Preserve in well-closed containers and protect from light.

• **USP Reference Standards** ⟨11⟩

USP Triclabendazole RS

USP Triclabendazole Related Compound A RS

5-Chloro-6-(2,3-dichlorophenoxy)-2-(methylsulfinyl)-1*H*-benzimidazole.

($C_{14}H_9Cl_3N_2O_2S$) 375.65

USP Triclabendazole Related Compound B RS

5-Chloro-6-(2,3-dichlorophenoxy)-1*H*-benzimidazole-2-thione.

($C_{13}H_7Cl_3N_2OS$) 345.62

USP Triclabendazole Related Compound D RS

4-Chloro-5-(2,3-dichlorophenoxy)-2-nitroaniline.

($C_{12}H_7Cl_3N_2O_3$) 333.55▲ (USP 1-Aug-2023)

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

Topic/Question	Contact	Expert Committee
TRICLABENDAZOLE	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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