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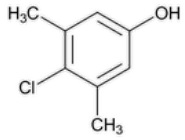
Chloroxylenol



C_8H_9ClO 156.61

Phenol, 4-chloro-3,5-dimethyl-;

4-Chloro-3,5-xylenol CAS RN®: 88-04-0; UNII: 0F32U78V2Q.

DEFINITION

Chloroxylenol contains NLT 98.5% of chloroxylenol (C_8H_9ClO).

IDENTIFICATION

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

Internal standard solution: 4 mg/mL of USP Parachlorophenol RS in toluene

Standard solution: 1 mg/mL of USP Chloroxylenol RS prepared as follows. Transfer 10 mg of USP Chloroxylenol RS to a 10.0-mL volumetric flask, add 2.0 mL of the *Internal standard solution*, and dilute with toluene to volume.

Sample solution: 1 mg/mL of Chloroxylenol prepared as follows. Transfer 10 mg of Chloroxylenol to a 10.0 mL volumetric flask, add 2.0 mL of the *Internal standard solution*, and dilute with toluene to volume.

Chromatographic system

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

Mode: GC

Detector: Flame ionization

Column: 0.32-mm × 30-m; coated with a 0.50-µm film of phase G42

Temperatures

Injection port: 250°

Detector: 250°

Column: See *Table 1*.

Table 1

Initial Temperature (°)	Temperature Ramp (°/min)	Final Temperature (°)	Hold Time at Final Temperature (min)
105	0	105	1
105	6	190	8

Carrier gas: Helium

Flow rate: 2.4 mL/min

Injection volume: 2 µL

Split ratio: 25:1

Run time: 23 min

System suitability

Sample: *Standard solution*

Suitability requirements

Resolution: NLT 5.0 between the parachlorophenol peak and the chloroxylenol peak

Tailing factor: NMT 1.5 for the chloroxylenol peak

Relative standard deviation: NMT 1.5%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of chloroxylenol (C_8H_9ClO) in the portion of Chloroxylenol taken:

$$\text{Result} = (R_U/R_S) \times (C_S/C_U) \times 100$$

R_U = peak area ratio of the chloroxylenol peak to the parachlorophenol peak from the *Sample solution*

R_S = peak area ratio of the chloroxylenol peak to the parachlorophenol peak from the *Standard solution*

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

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

Acceptance criteria: NLT 98.5%

IMPURITIES

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

Change to read:

• ▲**Iron ⟨241⟩, *Procedures, Procedure 1*▲** (CN 1-Jun-2023)

Sample: 0.10 g

Analysis: Transfer the *Sample* to a suitable crucible, add 5 drops of sulfuric acid, and ignite at a low heat until thoroughly ashed. Add 10 drops of sulfuric acid to the carbonized mass, and heat cautiously until white fumes are no longer evolved. Ignite, preferably in a muffle furnace, at 500°–600°, until the carbon is completely burned off. Cool, add 4 mL of 6 N hydrochloric acid, cover, digest on a steam bath for 15 min, uncover, and slowly evaporate on a steam bath to dryness. Moisten the residue with 1 drop of hydrochloric acid, add 10 mL of hot water, and digest for 2 min. Dilute with water to 25 mL. Filter, if necessary. Rinse the crucible and the filter with 10 mL of water, combining the filtrate and rinsing in a 50-mL color-comparison tube; add 2 mL of hydrochloric acid; dilute with water to 47 mL; and mix.

Acceptance criteria: NMT 0.01%

• **Limit of Tetrachloroethylene**

Internal standard stock solution: 20 µL/mL of 1-butanol in methanol

Internal standard solution: 2 µL/mL of 1-butanol in methanol from *Internal standard stock solution*

Tetrachloroethylene standard stock solution: 20 µL/mL of tetrachloroethylene in methanol

Tetrachloroethylene standard solution: 2 µL/mL of tetrachloroethylene in methanol from *Tetrachloroethylene standard stock solution*

Standard solution: 0.4 µL/mL each of 1-butanol and tetrachloroethylene in methanol from *Internal standard solution* and *Tetrachloroethylene standard solution*, respectively, prepared as follows. Combine 5 mL each of *Internal standard solution* and *Tetrachloroethylene standard solution* in a 25-mL volumetric flask, dilute with methanol to volume, and mix.

Sample solution: 160 mg/mL of chloroxylenol and 0.4 µL/mL of 1-butanol in methanol prepared as follows. Weigh 4 g of chloroxylenol in a 25-mL volumetric flask, combine with 5 mL of *Internal standard solution*, and dilute with methanol to volume.

Chromatographic system

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

Mode: GC

Detector: Flame ionization

Column: 0.53-mm × 30-m; 1.0-µm film of phase G14 or G16

Carrier gas: Hydrogen

Temperatures

Injector: 240°

Detector: 240°

Column: See *Table 2*.

Table 2

Initial Temperature (°)	Temperature Ramp (°/min)	Final Temperature (°)	Hold Time at Final Temperature (min)
70	0	70	2
70	35	210	5

Flow rate: 12.8 mL/min

Injection volume: 0.5 µL

Split ratio: 20:1

System suitability

Sample: *Standard solution*

[NOTE—The relative retention times for tetrachloroethylene and 1-butanol are about 1.0 and 1.9, respectively.]

Suitability requirements

Resolution: NLT 1.5 between tetrachloroethylene and the solvent front of methanol

Tailing factor: NM T 1.2 for the tetrachloroethylene and 1-butanol peaks

Relative standard deviation: NMT 8.0% for the ratio of the 1-butanol to the tetrachloroethylene peak

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of tetrachloroethylene in the portion of Chloroxylenol taken by comparing the peak response ratio of tetrachloroethylene to the internal standard from the *Standard solution* to that of the peak response ratio of tetrachloroethylene to the internal standard from the *Sample solution*:

$$\text{Result} = (R_U/R_S) \times (C_S/C_U) \times d \times F \times 100$$

R_U = peak response ratio of tetrachloroethylene to 1-butanol from the *Sample solution*

R_S = peak response ratio of tetrachloroethylene to 1-butanol from the *Standard solution*

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

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

d = density of tetrachloroethylene, 1.623 g/mL

F = conversion factor, 1 mg/0.001 g

Acceptance criteria: NMT 0.4% of tetrachloroethylene

- **ORGANIC IMPURITIES**

Standard solution: 0.02 mg/mL each of 3,5-dimethylphenol and USP Chloroxylenol Related Compound A RS in toluene

Sample solution: 10.0 mg/mL of Chloroxylenol in toluene

Chromatographic system: Proceed as directed in the *Assay*.

System suitability

Sample: *Standard solution*

[NOTE—For relative retention times, see *Table 3*.]

Suitability requirements

Resolution: NLT 8 between 3,5-dimethylphenol and chloroxylenol related compound A

Relative standard deviation: NMT 3%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentages of 3,5-dimethylphenol ($C_8H_{10}O$) and chloroxylenol related compound A (C_8H_9ClO) in the portion of Chloroxylenol taken:

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

r_U = peak response of the appropriate analyte from the *Sample solution*

r_S = peak response of the 3,5-dimethylphenol or chloroxylenol related compound A from the *Standard solution*

C_S = concentration of 3,5-dimethylphenol or USP Chloroxylenol Related Compound A RS in the *Standard solution* (mg/mL)

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

Calculate the percentage of each unspecified impurity in the portion of Chloroxylenol taken:

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

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

r_T = sum of all the peak responses

Acceptance criteria: See *Table 3*.

Table 3

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
3,5-Dimethylphenol	0.58	0.2
Chloroxylenol related compound A	0.64	0.2
Chloroxylenol	1.0	—
Any individual impurity	—	0.5
Total impurities	—	1.5

SPECIFIC TESTS

• **Water Determination, *Method I*⟨921⟩:** NMT 0.5%

ADDITIONAL REQUIREMENTS

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

• **USP Reference Standards ⟨11⟩**

USP Chloroxylenol RS

USP Chloroxylenol Related Compound A RS

2-Chloro-3,5-dimethylphenol.

USP Parachlorophenol RS

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

Topic/Question	Contact	Expert Committee
CHLOROXYLENOL	Documentary Standards Support	SM12020 Small Molecules 1

Chromatographic Database Information: Chromatographic Database

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