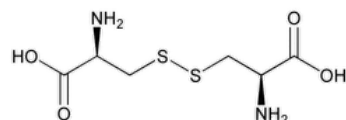


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Cystine



$C_6H_{12}N_2O_4S_2$ 240.30

L-Cystine;

3,3'-Disulfanediylbis [(2*R*)-2-aminopropanoic acid] CAS RN[®]: 56-89-3; UNII: 48TCX9A1VT.

DEFINITION

Cystine contains NLT 98.5% and NMT 101.5% of cystine ($C_6H_{12}N_2O_4S_2$), as L-cystine, calculated on the dried basis.

IDENTIFICATION

- **A. SPECTROSCOPIC IDENTIFICATION TESTS (197), Infrared Spectroscopy: 197K**
- **B. OPTICAL ROTATION (781S), Procedures, Specific Rotation**

Sample solution: 20 mg/mL, in 1 N [hydrochloric acid](#). Perform the measurements immediately after preparation.

Acceptance criteria: −215° to −225°, determined at 20°

- **C.** The R_F value of the principal spot of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the test for *Organic Impurities*.

ASSAY

PROCEDURE

Sample solution: Transfer about 0.1 g of Cystine to a glass-stoppered flask, and dissolve in a mixture of 2 mL of dilute sodium hydroxide (50 g/L in [water](#)) and 10 mL of [water](#). Add 10 mL of freshly prepared [potassium bromide](#) solution (200 g/L in [water](#)), 50.0 mL of [0.1 N potassium bromate VS](#), and 15 mL of dilute [hydrochloric acid](#) (170 mL/L in [water](#)). Immediately insert the stopper into the flask, mix the solution well, and cool in an ice water bath for 10 min in the dark.

Titrimetric system

(See [Titrimetry \(541\)](#).)

Mode: Residual titration

Titrant: [0.1 N potassium bromate VS](#)

Back-titrant: [0.1 N sodium thiosulfate VS](#)

Endpoint detection: Visual

Equivalency: Each milliliter of [0.1 N potassium bromate VS](#) is equivalent to 2.403 mg of cystine ($C_6H_{12}N_2O_4S_2$) on the dried basis.

Analysis: Immediately add 5 mL of [potassium iodide](#) solution (1.5 g in 5 mL of [water](#)) to the *Sample solution*, and mix well. Titrate slowly (dropwise addition) with *Back-titrant*, using [starch TS](#) as the indicator. Perform a blank determination, and make any necessary correction.

Acceptance criteria: 98.5%–101.5% on the dried basis

IMPURITIES

- **RESIDUE ON IGNITION (281):** NMT 0.1%
- **CHLORIDE AND SULFATE (221), Chloride:** NMT 200 ppm. A 0.7-g portion shows no more chloride than corresponds to 0.40 mL of 0.01 N [hydrochloric acid](#).
- **CHLORIDE AND SULFATE (221), Sulfate**

Standard solution: Dissolve 0.10 mL of 0.020 N [sulfuric acid](#) in 5 mL of dilute [hydrochloric acid](#) (0.2 g/mL in water), and dilute with [water](#) to 40 mL.

Sample solution: Dissolve 0.48 g of Cystine in 5 mL of dilute [hydrochloric acid](#) (0.2 g/mL in water) and dilute with [water](#) to 40 mL.

Analysis: Add 5 mL of [barium chloride TS](#) to the *Sample solution* and to the *Standard solution*. Add sufficient [water](#) to bring the final volume of each solution to 50 mL. Mix well, and allow the solutions to stand for 10 min.

Acceptance criteria: The observed turbidity of the *Sample solution* is NMT that of the *Standard solution* (NMT 200 ppm).

Change to read:

- ▲ [Iron \(241\)](#), [Procedures, Procedure 1](#) ▲ (CN 1-JUN-2023) : NMT 10 ppm

• **ORGANIC IMPURITIES**

System suitability solution: Dissolve quantities of [USP Cystine RS](#) and [USP Arginine Hydrochloride RS](#) in 1 N [hydrochloric acid](#), and dilute with [water](#) to obtain a solution having a known concentration of about 0.4 mg/mL each.

Standard solution: Dissolve a quantity of [USP Cystine RS](#) in 1 N [hydrochloric acid](#), and dilute with [water](#) to obtain a solution having a known concentration of about 0.02 mg/mL.

Sample solution: Dissolve a quantity of Cystine in 1 N [hydrochloric acid](#), and dilute with [water](#) to obtain a solution having a known concentration of about 10 mg/mL.

Chromatographic system

(See [Chromatography \(621\)](#), [General Procedures, Thin-Layer Chromatography](#).)

Mode: TLC

Adsorbent: 0.25-mm layer of chromatographic silica gel mixture

Application volume: 5 µL

Developing solvent system: [Ammonia](#) and [2-propanol](#) (3:7)

Spray reagent: Dissolve 0.2 g of [ninhydrin](#) in 100 mL of a mixture of [butanol](#) and 2 N [acetic acid](#) (95:5).

Analysis

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

Proceed as directed in the chapter. After air-drying the plate, spray with *Spray reagent*, and heat between 100° and 105° for about 15 min.

Examine the plate. The chromatogram from the *System suitability solution* exhibits 2 clearly separated spots.

Acceptance criteria: Any secondary spot from the *Sample solution* is not larger or more intense than the principal spot from the *Standard solution*.

Individual impurities: NMT 0.2%

Total impurities: NMT 2.0%

SPECIFIC TESTS

- [Loss on Drying \(731\)](#)

Analysis: Dry at 105° for 3 h.

Acceptance criteria: NMT 0.2%

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in well-closed containers, and store at controlled room temperature.

- [USP REFERENCE STANDARDS \(11\)](#)

[USP Arginine Hydrochloride RS](#)

[USP Cystine RS](#)

Auxiliary Information - Please [check for your question in the FAQs](#) before contacting USP.

Topic/Question	Contact	Expert Committee
CYSTINE	Fatkhulla K Tadjimukhamedov Associate Scientific Liaison	NBDS2020 Non-botanical Dietary Supplements

Chromatographic Database Information: [Chromatographic Database](#)

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