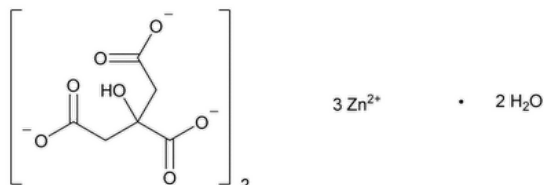


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Zinc Citrate



$C_{12}H_{10}O_{14}Zn_3 \cdot 2H_2O$ 610.36

2-Hydroxy-1,2,3-propanetricarboxylic acid zinc salt, dihydrate CAS RN®: 5990-32-9.

Anhydrous CAS RN®: 546-46-3.

DEFINITION

Zinc Citrate contains NLT 31.3% of zinc (Zn), calculated on the dried basis.

IDENTIFICATION

- **A.** [IDENTIFICATION TESTS—GENERAL, Zinc \(191\)](#): A solution (1 in 10) meets the requirements.
- **B.** [IDENTIFICATION TESTS—GENERAL, Citrate \(191\)](#): A solution (1 in 10) meets the requirements.

ASSAY

• PROCEDURE

Sample: 350 mg of Zinc Citrate, previously dried at 105° for 2 h

Blank: 60 mL of water

Titrimetric system

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

Mode: Direct titration

Titrant: 0.05 M edetate disodium VS

Endpoint detection: Visual

Analysis: Dissolve the *Sample* in 60 mL of water. Add 10 mL of ammonia–ammonium chloride buffer TS and 0.1 mL of eriochrome black TS.

Titrate with the *Titrant* to a blue endpoint. Perform a blank determination.

Calculate the percentage of zinc (Zn) in the portion of Zinc Citrate taken:

$$\text{Result} = [(V - B) \times M \times F \times 100]/W$$

V = sample titrant volume (mL)

B = blank titrant volume (mL)

M = titrant molarity (mM/mL)

F = equivalency factor, 65.4 mg/mM

W = sample weight (mg)

Acceptance criteria: NLT 31.3% on the dried basis

IMPURITIES

• [CHLORIDE AND SULFATE, Chloride\(221\)](#): A 1.0-g portion shows no more chloride than corresponds to 0.7 mL of 0.020 N hydrochloric acid (NMT 0.05%).

• [CHLORIDE AND SULFATE, Sulfate\(221\)](#): A 1.8-g portion shows no more sulfate than corresponds to 0.5 mL of 0.020 N sulfuric acid (NMT 0.05%).

• **LIMIT OF ARSENIC, CADMIUM, AND LEAD**

Arsenic standard solution: 1.0 µg/mL in 1% nitric acid, prepared from an arsenic standard solution (10 mg/L)



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Cadmium standard solution: 1.0 µg/mL in 1% nitric acid, prepared from a cadmium standard solution (10 mg/L)

Lead standard solution: 1.0 µg/mL in 1% nitric acid, prepared from a lead standard solution (10 mg/L)

Multi-element standard solution: 10 µg/L of lead, 5 µg/L of cadmium, and 3 µg/L of arsenic in 1% nitric acid, prepared from the *Lead standard solution*, *Cadmium standard solution*, and *Arsenic standard solution*, respectively

Sample solution: 2 mg/mL of Zinc Citrate in 1% nitric acid

Instrumental conditions

(See [Plasma Spectrochemistry \(730\)](#).)

Mode: ICP-MS

Radio frequency: 1350 Watts

Nebulizer flow rate: 0.9 L/min

[NOTE—The radio frequency and nebulizer flow rate settings may be developed and optimized based on the manufacturer's recommendation.]

Detection atomic masses: As, Cd, and Pb

Blank: 1% nitric acid solution

Analysis

Samples: *Multi-element standard solution*, *Sample solution*, and *Blank*

Determine the responses of the *Multi-element standard solution*, *Sample solution*, and *Blank* at the masses indicated above.

Calculate the content of each element, in µg/g, in the portion of Zinc Citrate taken:

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

r_U = peak response of the corresponding element from the *Sample solution*

r_S = peak response of the corresponding element from the *Multi-element standard solution*

C_S = concentration of the corresponding element in the *Multi-element standard solution* (µg/L)

C_U = concentration of Zinc Citrate in the *Sample solution* (g/L)

Acceptance criteria

Arsenic: NMT 3 µg/g

Cadmium: NMT 5 µg/g

Lead: NMT 10 µg/g

SPECIFIC TESTS

- **LOSS ON DRYING (731):** Dry a sample at 105° for 2 h: it loses NMT 1.0% of its weight.
- **MICROBIAL ENUMERATION TESTS (2021):** The total aerobic microbial count does not exceed 10^3 cfu/g. The total combined yeasts and molds count does not exceed 10^2 cfu/g.
- **MICROBIOLOGICAL PROCEDURES FOR ABSENCE OF SPECIFIED MICROORGANISMS (2022):** It meets the requirements of the test for absence of *Escherichia coli*.

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in well-closed containers.

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

Topic/Question	Contact	Expert Committee
ZINC CITRATE	Nagaphani Batchu Senior Scientist I, Documentary Standards	NBDS2020 Non-botanical Dietary Supplements
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	NBDS2020 Non-botanical Dietary Supplements

Chromatographic Database Information: [Chromatographic Database](#)

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