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Chlorophyllin Copper Complex Sodium

DEFINITION

Chlorophyllin Copper Complex Sodium contains sodium salts of copper-chelated chlorophyll derivatives. It contains no artificial coloring.

IDENTIFICATION

- **A. [ULTRAVIOLET-VISIBLE SPECTROSCOPY \(857\)](#).** (in the visible region)
Sample solution: 10 µg/mL
Medium: pH 7.5 phosphate buffer, prepared by mixing 0.15 M dibasic sodium phosphate and 0.15 M monobasic potassium phosphate (21:4)
Acceptance criteria: The ratio of A_{405}/A_{630} is 3.0–3.9.

OTHER COMPONENTS

- **CONTENT OF TOTAL COPPER**
Stock solution 1: 1000 µg/mL of copper. Transfer 1.000 g of copper to a 1000-mL volumetric flask, dissolve in 20 mL of nitric acid, and dilute with 0.2 N nitric acid to volume. [NOTE—Store in a polyethylene bottle.]
Stock solution 2: 10 µg/mL of copper. Transfer 5.0 mL of *Stock solution 1* into a 500-mL volumetric flask, and dilute with water to volume.
Standard solutions: Transfer 5.0, 10.0, 15.0, and 20.0 mL, respectively, of *Stock solution 2* to separate 100-mL volumetric flasks, and dilute the contents of each flask with water to volume. These *Standard solutions* contain 0.5, 1.0, 1.5, and 2.0 µg/mL of copper, respectively.
Sample solution: Transfer 100 mg of previously dried Chlorophyllin Copper Complex Sodium to a Kjeldahl flask. Add 2.0 mL of sulfuric acid, 1.0 mL of nitric acid, and 1.0 mL of hydrogen peroxide, and carefully heat under a fume hood until a light green color is obtained. [NOTE—If the solution has any hint of a brown tint, continue to add 0.5-mL portions of nitric acid until a green color is obtained.] Cool, transfer the contents quantitatively to a 1000-mL volumetric flask with several portions of water, dilute the contents of the flask with water to volume, and mix. Transfer 10.0 mL of this solution to a 50-mL volumetric flask, and dilute with water to volume.

Instrumental conditions

- (See [Atomic Absorption Spectroscopy \(852\)](#).)
- Mode:** Atomic absorption spectrophotometry
 - Lamp:** Copper hollow-cathode
 - Flame:** Air–acetylene
 - Analytical wavelength:** Copper emission line of 324.8 nm
 - Blank:** Water

Analysis

- **Samples:** *Standard solutions* and *Sample solution*
Determine the absorbances of the *Standard solutions* and the *Sample solution*. Plot the absorbances of the *Standard solutions* versus the concentration, in µg/mL, of copper, and draw the straight line best fitting the four plotted points. From the graph so obtained, determine the concentration, *C*, in µg/mL, of copper in the *Sample solution*.
Calculate the percentage of copper in the portion of Chlorophyllin Copper Complex Sodium taken:

$$\text{Result} = (C/W) \times (V/F) \times 100$$

- C* = concentration of the *Sample solution* determined from the graph (µg/mL)
- W* = weight of Chlorophyllin Copper Complex Sodium taken to prepare the *Sample solution* (mg)
- V* = final volume of *Sample solution*, 5000 mL
- F* = conversion factor, 1000 µg/mg

Acceptance criteria: NLT 4.25% on the dried basis

- **CONTENT OF CHELATED COPPER**
Analysis: Calculate the percentage of chelated copper in the portion of Chlorophyllin Copper Complex Sodium taken by subtracting the percentage of ionic copper found in the test for *Limit of Ionic Copper* from the percentage of total copper found in the test for *Content of Total Copper*.
Acceptance criteria: NLT 4.0% on the dried basis
- **CONTENT OF SODIUM**
Standard stock solution: 100 µg/mL of sodium. Dissolve 254.2 mg of sodium chloride, previously dried at 105° for 2 h, in 50 mL of water. Transfer to a 1000-mL volumetric flask, and dilute with water to volume.

Standard solutions: Transfer to each of four 100-mL volumetric flasks 10 mL of a nonionic wetting agent solution (1 in 500). To each flask add, respectively, 2.5, 5.0, 10.0, and 15.0 mL of the *Standard stock solution*, and dilute with water to volume. These *Standard solutions* contain 2.5, 5.0, 10.0, and 15.0 µg/mL of sodium, respectively.

Blank: Transfer 10 mL of a nonionic wetting agent solution (1 in 500) into a 100-mL volumetric flask, and dilute with water to volume.

Sample solution: Transfer 100 mg of Chlorophyllin Copper Complex Sodium to a 1000-mL volumetric flask. Add 100 mL of a solution of nonionic wetting agent (1 in 500) and 400 mL of water, and shake by mechanical means for 5 min. Dilute with water to volume.

Analysis

Samples: *Standard solutions* and *Sample solution*

Set the flame photometer for maximum transmission at a wavelength of 589 nm. Adjust the instrument to zero transmittance with the *Blank*. Adjust the instrument to 100% transmittance with the most concentrated of the *Standard solutions*. Read the percentage of transmittance of the other *Standard solutions*, and plot the percentage of transmittance versus the concentration, in µg/mL, of sodium. Read the percentage of transmittance of the *Sample solution*, and from the graph read the concentration, *C*, in µg/mL, of sodium in the *Sample solution*.

Calculate the percentage of sodium in the portion of Chlorophyllin Copper Complex Sodium taken:

$$\text{Result} = (C/W) \times (V/F) \times 100$$

C = concentration of the *Sample solution* determined from the graph (µg/mL)

W = weight of Chlorophyllin Copper Complex Sodium taken to prepare the *Sample solution* (mg)

V = volume of *Sample solution*, 1000 mL

F = conversion factor, 1000 µg/mg

Acceptance criteria: 5%–7% on the dried basis

- **NITROGEN DETERMINATION (461), Method I:** NLT 4.0%

IMPURITIES

• LIMIT OF IONIC COPPER

Standard solutions: Prepare as directed in the test for *Content of Total Copper*.

Sample solution: Transfer 100 mg of Chlorophyllin Copper Complex Sodium to a 150-mL conical flask. Add 75 mL of water, and shake by mechanical means for 3 min. Adjust with 1 N hydrochloric acid to a pH of 3.0, transfer the suspension thus obtained to a 100-mL volumetric flask, and dilute with water to volume. Filter this suspension, discarding the first 10 mL of the filtrate. Use the clear filtrate for analysis.

Analysis

Samples: *Standard solutions* and *Sample solution*

Proceed as directed in the test for *Content of Total Copper*.

Calculate the percentage of ionic copper in the portion of Chlorophyllin Copper Complex Sodium taken:

$$\text{Result} = (C/W) \times (V/F) \times 100$$

C = concentration of the *Sample solution* determined from the graph (µg/mL)

W = weight of Chlorophyllin Copper Complex Sodium taken to prepare the *Sample solution* (in mg on the dried basis)

V = volume of *Sample solution*, 100 mL

F = conversion factor, 1000 µg/mg

Acceptance criteria: NMT 0.25% on the dried basis

- **RESIDUE ON IGNITION (281):** NMT 30% on the dried basis

Change to read:

- **▲ IRON (241), Procedures, Procedure 1 ▲** (CN 1-JUN-2023) : NMT 0.50%

SPECIFIC TESTS

- **MICROBIAL ENUMERATION TESTS (61)** and **TESTS FOR SPECIFIED MICROORGANISMS (62):** It meets the requirements of the tests for absence of *Escherichia coli* and *Salmonella* species.

- **pH (791):** 9.5–10.7, in a solution (1 in 100)

- **LOSS ON DRYING (731)**

Analysis: Dry at 105° for 2 h.

Acceptance criteria: NMT 5%

- **TEST FOR FLUORESCENCE**

Sample solution: 10 mg/mL

Analysis: Apply 10 µL of *Sample solution* on filter paper, allow to dry, and examine the area of application under long-wavelength UV light through a red optical filter.

Acceptance criteria: No fluorescence is visible.

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight, light-resistant containers.

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

Topic/Question	Contact	Expert Committee
CHLOROPHYLLIN COPPER COMPLEX SODIUM	Documentary Standards Support	SM32020 Small Molecules 3

Chromatographic Database Information: [Chromatographic Database](#)

Most Recently Appeared In:

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