Status: Currently Official on 15-Feb-2025
Official Date: Official as of 01-May-2013
Document Type: USP Monographs
DocId: GUID-133BDF3B-5CD1-41CA-838C-C0CFEC482934_1_en-US
DOI: https://doi.org/10.31003/USPNF_M42430_01_01
DOI Ref: q6clk

Iron, Carbonyl

Fe 55.85 CAS RN®: 7439-89-6; UNII: E1UOL152H7.

DEFINITION

Carbonyl Iron is elemental iron produced by chemical decomposition of purified iron pentacarbonyl. It is a powder, composed of spherical microparticles. It contains NLT 98.0% of iron (Fe), calculated on the as-is basis.

IDENTIFICATION

• **A.**

Analysis: Dissolve a sample in a dilute mineral acid.

Acceptance criteria: Hydrogen is evolved, and the resulting solutions give a positive test for *Identification Tests—General* ⟨191⟩, *Iron, Ferrous Salts*.

• **B.**

Analysis: View a sample under a microscope having a magnifying power of 500 or greater.

Acceptance criteria: It appears as spheres built up with concentric shells. Its particle size is 45–75 µm.

ASSAY

• **Procedure**

Sample: 200 mg

Blank: Proceed as directed in the *Analysis*, omitting use of the *Sample*.

Titrimetric system

(See *Titrimetry* ⟨541⟩.)

Mode: Direct titration

Titrant: 0.1 N ceric sulfate VS

Endpoint detection: Potentiometric

Electrode system: Platinum indicating electrode and a silver–silver chloride reference electrode (or an equivalent combination electrode)

Analysis: Transfer the *Sample* into a 300-mL Erlenmeyer flask. Add 50 mL of 2 N sulfuric acid, and close the flask with a stopper containing a Bunsen valve (made by inserting a glass tube connected to a short piece of rubber tubing with a slit on the side and a glass rod inserted in the other end and arranged so that gases can escape but air cannot enter). Heat on a steam bath to completely dissolve the *Sample*. [Note—The solution should be clear.] Remove the flask from the steam bath, and allow the solution to cool at room temperature with the stopper in place.

Add a stir bar and 50 mL of recently boiled and cooled water to the flask. Titrate the solution with the *Titrant* through the inflection point. Perform a blank determination.

Calculate the percentage of iron (Fe) in the *Sample* taken:

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

V_S = *Titrant* volume consumed by the *Sample* (mL)

V_B = *Titrant* volume consumed by the *Blank* (mL)

N = actual *Titrant* normality (mEq/mL)

F = equivalency factor, 55.85 mg/mEq

W = *Sample* weight (mg)

Acceptance criteria: NLT 98.0% on the as-is basis

IMPURITIES

• **Acid-Insoluble Substances**

Sample: 1 g of Carbonyl Iron

Analysis: Dissolve the *Sample* in 25 mL of 2 N sulfuric acid, and heat on a steam bath until the evolution of hydrogen ceases. Filter through a tared filter crucible, wash the residue with water until free from sulfate, dry at 105° for 1 h, cool to room temperature, and weigh.

Acceptance criteria: NMT 0.2%. The residue weighs NMT 2 mg.

• **Elemental Impurities,** *Procedures* ⟨233⟩

Acceptance criteria

Arsenic: NMT 3 µg/g

Lead: NMT 4 µg/g

Mercury: NMT 2 µg/g

SPECIFIC TESTS

• **Particle Size Distribution Estimation By Analytical Sieving,** *Test Sieves*⟨786⟩**:** NLT 100% passes through a 200-mesh sieve and NLT 95% passes through a 325-mesh sieve.

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
IRON, CARBONYL	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

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. PF 37(6)

Current DocID: GUID-133BDF3B-5CD1-41CA-838C-C0CFEC482934_1_en-US

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