

ICS 73.060.10

CCS D 31



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 38812.4-2022

**Direct reduced iron - Determination of metallic iron -
Bromine-methanol titrimetric method**

Issued on: December 30, 2022

Implemented on: April 1, 2023

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

foreword

Introduction

1 Scope

2 Normative references

3 Terms and Definitions

4 principles

5 reagents

foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules for Standardization Documents" drafting.

This document is Part 4 of GB/T 38812 "Direct Reduced Iron". GB/T 38812 has issued the following parts.

--- Part 1. Determination of ferrous content - ferric chloride decomposition potassium dichromate titration method;

--- Part 2. Determination of metallic iron content - ferric chloride decomposition potassium dichromate titration method;

--- Part 3. Determination of silicon, manganese, phosphorus, vanadium, titanium, copper, aluminum, arsenic, magnesium, calcium, potassium, sodium content Inductively coupled plasma atomic emission

spectroscopy;

--- Part 4. Determination of metallic iron content - bromine - methanol titration.

This document is modified to adopt ISO 5416.2006 "Determination of iron content in direct reduced iron metal - bromine-methanol titration method".

Compared with ISO 5416.2006, this document has made the following structural adjustments.

--- The chapter "Terms and Definitions" has been added;

--- Change the chapter number of reagents, numbering according to the order of use of reagents in the determination method (see Chapter 5, ISO 5416.2006

Chapter 4);

--- Deleted 4.7, 5.1, 5.2, Appendix C, Appendix D and Appendix E of ISO 5416.2006.

Compared with ISO 5416.2006, this document has many technical differences, and the vertical single

Lines (|) are marked. See Appendix A for a list of these technical differences and their causes.

Please note that some contents of this document may refer to patents. The issuing agency of this document assumes no responsibility for identifying patents.

Introduction

Direct reduced iron is an essential high-grade raw material for the production of high-quality steel. The content of metallic iron is the main index to measure the quality of direct reduced iron.

It indicates the degree of metallization and impurity content of direct reduced iron. Therefore, the determination of metallic iron content has become an important aspect of the quality of direct reduced iron.

Test content.

Foreign standards (ISO, Britain, France, South Korea, etc.) mostly use bromine-methanol titration method to determine metallic iron in direct reduced iron, which is widely used in practice.

The rate is very high, but there is no domestic standard for bromine-methanol titration. Therefore, the formulation of this document can be in line with international standards and has a good comparable

Right. At the same time, GB/T 38812 "Direct Reduced Iron" was improved to keep in line with the international standard.

In order to ensure the availability of GB/T 38812, the document is compiled into several parts. GB/T 38812 is proposed to consist of the following parts.

--- Part 1.Determination of ferrous content - ferric chloride decomposition potassium dichromate titration method;

--- Part 2.Determination of metallic iron content - ferric chloride decomposition potassium dichromate titration method;

--- Part 3.Determination of silicon, manganese, phosphorus, vanadium, titanium, copper, aluminum, arsenic, magnesium, calcium, potassium, sodium content Inductively coupled plasma atomic emission

spectroscopy;

--- Part 4.Determination of metallic iron content - bromine - methanol titration.

Determination of iron content in direct reduced iron metal

Bromine-methanol titration

Caution --- Personnel using this document should have formal laboratory work experience.
All possible security issues not addressed in this document

Therefore, the user is responsible for taking appropriate safety and health measures and ensuring compliance with the conditions stipulated in relevant national laws and regulations.

1 Scope

This document specifies a method for the determination of metallic iron by oxidation-reduction titration by dissolving metallic iron in bromine-methanol.

This document is applicable to the determination of metallic iron content in direct reduced iron, and the determination range (mass fraction) is 15% to 95%.

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, dated references

For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

this document.

GB/T 6379.2 Accuracy of measurement methods and results (trueness and precision) - Part 2.Determination of repeatability of standard measurement methods

Basic methods of reliability and reproducibility (GB/T 6379.2-2004, ISO 5725-2.1994, IDT)

GB/T 6682 Analytical laboratory water specifications and test methods (GB/T 6682-2008, ISO 3696.1987, MOD)

GB/T 6730.3 Determination of hygroscopic water in iron ore analysis samples by gravimetric method, Karl Fischer method and mass loss method

(GB/T 6730.3-2017, ISO 2596.2006, MOD)

GB/T 8170 Numerical rounding off rules and expression and determination of limit values

GB/T 12805 Laboratory glass instrument burettes (GB/T 12805-2011, ISO 385.2005, NEQ)

GB/T 12806 Laboratory Glass Instruments Single Marked Line Volumetric Flasks (GB/T

12806-2011, ISO 1042.1998, NEQ)

GB/T 12808 Laboratory glassware single-marked pipette

GB/T 24239 Sampling and sample preparation of direct reduced iron and hot briquetted iron (GB/T 24239-2009, ISO 10835.

2007, IDT)

3 Terms and Definitions

This document does not have terms and definitions that need to be defined.

4 principles

Dissolve metallic iron with bromine-methanol mixed solution, filter and separate the residue, add sulfuric acid and hydrogen peroxide to the filtrate to remove bromide and formazan

Alcohol, use stannous chloride and titanium trichloride to reduce ferric iron to ferrous iron, use dilute potassium dichromate solution to oxidize the excess reducing agent, and diphenylamine sulfonic acid

Sodium is used as an indicator, and it is titrated with potassium dichromate standard solution.

5 reagents

Unless otherwise stated in the analysis, only approved reagents of analytical grade were used.