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

GB/T 223.31-2026

**Iron, steel and alloy - Determination of arsenic content -
spectrophotometric method and iodimetric method
(English Translation)**

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Foreword

This Document was drafted as per the rules specified in GB/T 1.1-2020 Directives for Standardization - Part 1.Rules for the Structure and Drafting of Standardizing Documents.

This Document is Part 31 of GB/T 223; the published parts of GB/T 223 are shown in Appendix

A.

This Document replaced GB/T 223.31-2008 Iron, Steel and Alloy - Determination of Arsenic Content - Distillation-Molybdenum Blue Spectrophotometric Method, and GB/T 223.32-1994

Methods for Chemical Analysis of Iron, Steel and Alloy - The Hypophosphite Reduction-Iodometric Method for the Determination of Arsenic Content. Compared with GB/T 223.31-

2008 and GB/T 223.32-1994, the major technical changes of this Document are as follows

besides the structural adjustments and editorial modifications.

--- Change the determination range for Method II (sodium hypophosphite reduction-iodometry) from "0.010% ~ 3.00%" to "0.010% ~ 0.65%" (see Clause 1 of this Document; Clause 1 of GB/T 223.32-1994);

--- Add requirements for laboratory water for Method II (sodium hypophosphite reduction-

iodometry) (see 5.2 of this Document);

--- Add requirements for instruments and equipment for Method II (sodium hypophosphite reduction-iodometry) (see 5.3 of this Document);

--- Add requirements for sample collection and preparation for Method II (sodium hypophosphite reduction-iodometry) (see 5.4 of this Document);

--- Delete the "arsenic content range of 1.00% ~ 3.00% and the corresponding sample mass"

from Method II (sodium hypophosphite reduction-iodometry) (see 5.5.1 of this Document; 4.1 of GB/T 223.32-1994);

--- Change the arsenic content range corresponding to a sample mass of 0.50 g in Method II

(sodium hypophosphite reduction-iodometry) from ">0.50 ~ 1.0" to ">0.50" (see 5.5.1 of this Document; 4.1 of GB/T 223.32-1994).

This Document modified and adopted ISO 17058.2004 Steel and Iron - Determination of Arsenic Content - Spectrophotometric Method.

Compared with ISO 17058.2004, this Document made more structural adjustments. The comparison list on the change in clause numbers between the two documents are shown in Appendix B.

The technical differences and causes between this Document and ISO 17058.2004 are as follows.

Iron, Steel and Alloy - Determination of Arsenic Content -
Spectrophotometric Method and Iodometric Method

WARNING. Users of this Document shall have practical experience working in standard laboratory. This Document does not address all possible safety issues. It is the responsibility of the user to adopt appropriate safety and health measures.

1 Scope

This Document specifies methods for the determination of arsenic content in iron, steel, and

alloys using spectrophotometry and iodometry.

The application ranges for the methods in this Document are as follows. Method I (distillation

separation - molybdenum blue spectrophotometry) is applicable to the determination of arsenic

content with mass fraction in the range of 0.0005% ~ 0.10% in iron, steel, and alloys; Method

II (sodium hypophosphite reduction - iodometry) is applicable to the determination of arsenic

content with mass fraction in the range of 0.010% ~ 0.65% in pig iron, carbon steel, and alloy

steel.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates

indicated are applicable to this Document; for the undated documents, only the latest version

(including all the amendments) is applicable to this Document.

GB/T 6379.1 Accuracy (trueness and precision) of measurement methods and results - Part

1 General principles and definitions (GB/T 6379.1-2004, ISO 5725-1.1994, IDT)

GB/T 6379.2 Accuracy (trueness and precision) of measurement methods and results - Part

2 Basic method for the determination of repeatability and reproducibility of a standard

measurement method (GB/T 6379.2-2004, ISO 5725-2.1994, IDT)

GB/T 6379.3 Accuracy (trueness and precision) of measurement methods and results - Part

3 Intermediate measures of the precision of a standard measurement method (GB/T

6379.3-2012, ISO 5725-3.1994, IDT)

GB/T 6682 Water for analytical laboratory use - Specification and test methods (GB/T 6682-2008, ISO 3696.1987, MOD)

GB/T 12805 Laboratory glassware - Burettes (GB/T 12805-2011, ISO 385.2005, NEQ)

GB/T 12806 Laboratory glassware - One-mark volumetric flasks (GB/T 12806-2011, ISO 1042.1998, NEQ)

GB/T 12808 Laboratory glassware - One-mark pipettes

GB/T 20066 Steel and iron - Sampling and preparation of samples for the determination of chemical composition (ISO 14284.1996, IDT)

3 Terms and Definitions

For the purposes of this Document, there are no terms and definitions required to be defined.

4 Method I (Distillation Separation - Molybdenum Blue

Spectrophotometry)

4.1 Principle

Dissolve the test materials in a mixture of hydrochloric acid and nitric acid; add sulfuric acid; and continue heating until white fumes of sulfuric acid appear. In a medium of sulfuric and hydrochloric acids, add hydrazine sulfate and potassium bromide to reduce the arsenic; and separate it by distillation in the form of arsenic trichloride. Absorb the distillate in nitric acid; simultaneously oxidizing As (III) to As (V). Using hydrazine sulfate as the reducing agent, form

a molybdenum blue complex from the arsenic and ammonium molybdate. Perform spectrophotometric measurement at a wavelength of 840 nm; and calculate the mass fraction of

arsenic based on a pre-established calibration curve.