



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

GB/T 223.88-2019

**Iron, steel and alloy - Determination of calcium and magnesium
contents - Inductively coupled plasma atomic emission
spectrometric method**

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4.1 The content of pure iron, calcium and magnesium is less than 0.5 μ g/g.

4.2 Hydrochloric acid, rho about 1.19g/mL.

4.3 Hydrochloric acid, rho approximately 1.19 g/mL, diluted to 1 1.

4.4 Hydrochloric acid, rho approximately 1.19 g/mL, diluted to 14.

4.5 Hydrochloric acid, rho approximately 1.19 g/mL, diluted to 1 100.

4.6 Nitric acid, rho about 1.42g/mL.

4.7 Hydrofluoric acid, rho about 1.15g/mL.

4.8 Perchloric acid, rho about 1.67g/mL.

4.9 Mixed acid.

4.10 Calcium standard solution.

1 mL of this standard solution contained 0.100 mg of calcium.

1 mL of this standard solution contained 0.010 mg of calcium.

1 mL of this standard solution contained 0.001 mg of calcium.

4.11 Magnesium standard solution.

1 mL of this standard solution contained 0.100 mg of magnesium.

1 mL of this standard solution contained 0.010 mg of magnesium.

1 mL of this standard solution contained 0.001 mg of magnesium.

4.12 ? internal standard solution, 100mg/L.

1 mL of this standard solution contained 0.100 mg of hydrazine.

5 instruments

5.1 Inductively Coupled Plasma Atomic Emission Spectrometer

371.03 None

360.07 none

5.2 Polytetrafluoroethylene (PTFE) beakers and lids

5.3 Volumetric flask, volume 100mL, made of polypropylene or polyethylene terephthalate (PET).

6 Take samples

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Foreword

GB/T 223 is divided into several parts.

This part is the 88th part of GB/T 223.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This section uses the translation method equivalent to ISO 13933.2014 "Steel calcium and magnesium determination inductively coupled plasma atomic emission

Spectroscopy.

The documents of our country that have a consistent correspondence with the international documents referenced in this part are as follows.

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

---GB/T 12806-2011 Laboratory glass instrument single standard line volumetric flask (ISO 1042.1998, MOD)

---GB/T 20066-2006 Sampling and sample preparation method for samples for determination of chemical composition of steel and iron (ISO 14284.1996,

IDT)

This section has made the following editorial changes.

--- In line with the existing standard series, change the name of this part to "Inductive Coupling Isolation of Determination of Calcium and Magnesium Content in Steel and

Alloys"

Daughter atomic emission spectrometry.

This part was proposed by the China Iron and Steel Association.

This part is under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC183).

This section drafted by. Steel Research Nak Testing Technology Co., Ltd., Baosteel Special Steel Co., Ltd., Anshan Iron and Steel Co., Ltd., Wuhan Steel

Iron Co., Ltd., China Metallurgical Construction Research Institute Co., Ltd.

1 Scope

This part of GB/T 223 specifies the determination of pure iron, cast iron, steel and superalloys by inductively coupled plasma atomic emission spectrometry.

Method of calcium and magnesium content.

This section applies to the magnesium content with a mass fraction of 0.0005%~0.006% and a magnesium content of 0.0005%~0.20%.

Determination.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

ISO 385 laboratory glass instrument burette (Laboratoryglassware-Burettes)

ISO 648 laboratory glass instrument single-line pipette
(Laboratoryglassware-Single-volumepipettes)

ISO 1042 laboratory glass instrument single line volumetric flask
(Laboratoryglassware-Onemarkvolumetricflasks)

ISO 3696 Analytical Laboratory Water Regulations and Test Methods
(Waterforanalyticallaboratoryuse-Specification

Andtestmethods)

ISO 14284 Method for sampling and sample preparation of steel and iron chemical constituents (Steelandiron-Samplingand

Preparationofsamplesforthedeterminationofchemicalcomposition)

3 Principle

The sample was dissolved with a mixed acid of hydrochloric acid, nitric acid and hydrofluoric acid, and perchloric acid smoked. The salts are dissolved with hydrochloric acid and nitric acid. If necessary, join inside

Label the element and dilute to a certain volume. The solution is filtered (if necessary) and atomized into an inductively coupled plasma spectrometer, measuring each

The element analyzes the emission intensity of the line while measuring the emission intensity of the internal standard element line.

4 reagents

Unless otherwise stated, only analytically pure reagents identified as low levels of calcium and magnesium and secondary waters specified in ISO 3696 were used in the analysis.

Or water of considerable purity.

4.9 Mixed acid.

2 parts of hydrochloric acid (4.2), 1 part of nitric acid (4.6) and 3 parts of water were mixed.

4.10.1 Calcium stock solution, 1000mg/L.

Dry a few grams of calcium carbonate (mass fraction $\geq 99.9\%$) in an oven at $100\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for at least 1 h and cool to room in a desiccator

temperature. Weigh 2.497g of dried calcium carbonate to the nearest 0.0001g, place in a 400mL beaker, add 20mL of hydrochloric acid (4.3), cover the table

The dish is slowly heated until completely dissolved. After cooling to room temperature, the solution was transferred to a 1000 mL volumetric flask. Dilute to the mark with water,

Mix well.

This stock solution 1 mL contains 1.000 mg of calcium.

4.10.2 Calcium standard solution A, 100 mg/L.

Transfer 10.00 mL of calcium stock solution (4.10.1) into a 100 mL volumetric flask. Add 10 mL of hydrochloric acid (4.4). Dilute to the mark with water,

Mix well.

4.10.3 Calcium standard solution B, 10 mg/L.

10.00 mL of calcium standard solution A (4.10.2) was transferred to a 100 mL volumetric