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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 4333.11-2025

Ferrosilicon - Determination of titanium content - Diantipyrylmethane photometric method

硅铁 钛含量的测定 二安替吡啉甲烷分光光度法

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Foreword

This document conforms to GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting is scheduled. This document is Part 11 of GB/T 4333 Analytical Methods for Ferrosilicon. GB/T 4333 has already published the following parts. --Determination of silicon content in ferrosilicon using perchloric acid dehydration gravimetric method and potassium fluorosilicate titration method; --Determination of silicon-iron-phosphorus content.
Bismuth-phosphorus-molybdenum blue spectrophotometric method; -- Chemical analysis method for ferrosilicon. determination of manganese content by potassium periodate spectrophotometry; --Determination of silicon-iron-aluminum content using chromium azurite S spectrophotometry, EDTA titration, and flame atomic absorption spectrometry; --Determination of silicon, manganese, aluminum, calcium, chromium and iron content by wavelength dispersive X-ray fluorescence spectroscopy (fused glass slide method); --Determination of ferrosilicon and chromium content. diphenylcarbazide spectrophotometric method; --Determination of ferrosilicon sulfur content using infrared absorption method and barium sulfate gravimetric method with chromatographic separation; --Determination of ferrosilicon and calcium content by flame atomic absorption spectrometry; --Determination of silicon-iron-carbon content using infrared absorption method; --Determination of silicon-iron-titanium content. diantipyrrolidone spectrophotometric method; --Determination of lead, tin, arsenic, antimony and bismuth content in ferrosilicon by inductively coupled plasma mass spectrometry (ICP-MS). Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed by the China Iron and Steel Association. This document is under the jurisdiction of the National Technical Committee on Standardization of Pig Iron and Ferroalloys (SAC/TC 318). The main drafting units of this document are. Ansteel Co., Ltd., Wuxi Ximai Testing Technology Co., Ltd., and Ordos Xijin Mining and Metallurgy Co., Ltd. Liability companies, Jiangsu Binxin Steel Group Co., Ltd., Anyang Iron and Steel Group Co., Ltd., Inner Mongolia Xintaiyuan New Materials Co., Ltd. Company, Jilin Ferroalloy Co., Ltd., China Certification & Inspection Group Hebei Co., Ltd., and Metallurgical Industry Information and Standardization Research Institute. The main drafters of this document are.

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Because the detection process for ferrosilicon involves many elements, and the applicable scope and methods for each element vary, it is crucial to ensure the quality of silicon detection. The convenience and accuracy of iron testing standards, along with the analytical methods for different elements in ferrosilicon, have led to the establishment of a national standard system supporting ferrosilicon testing. GB/T 4333 is the basic standard for ferrosilicon series analysis methods in my country, which consists of the following 11 parts. --Determination of silicon content in ferrosilicon using the perchloric acid dehydration gravimetric method and the potassium fluorosilicate titration method. The purpose is to measure the silicon content in ferrosilicon. The measurements were taken using the perchloric acid dehydration gravimetric method and the potassium fluorosilicate volumetric method. --Determination of Phosphorus Content in Ferrosilicon using Bismuth Phosphomolybdic Blue Spectrophotometry. The purpose is to measure the phosphorus content in ferrosilicon using bismuth phosphomolybdic blue. Spectrophotometry. --A chemical analysis method for ferrosilicon. determination of manganese content using the potassium periodate spectrophotometric method. The purpose is to measure the manganese content in ferrosilicon using periodate. Potassium spectrophotometry. --Determination of ferrosilicon and aluminum content using chromium azure S spectrophotometry, EDTA titration, and flame atomic absorption spectrometry. Objective The method for measuring the aluminum content in ferrosilicon is as follows: azurite S spectrophotometry, EDTA titration, and flame atomic absorption spectrometry. --Determination of silicon, manganese, aluminum, calcium, chromium, and iron content using wavelength dispersive X-ray fluorescence spectroscopy (fused glass slide method). The key lies in measuring the content of silicon, manganese, aluminum, calcium, chromium, and iron in ferrosilicon, using wavelength dispersive X-ray fluorescence spectroscopy (for fused cast glass). (Slice method). --Determination of Chromium Content in Ferrosilicon using the Diphenylcarbazide Spectrophotometric Method. The purpose is to measure the chromium content in ferrosilicon using the diphenylcarbazide spectrophotometric method. Phenylene carbazide spectrophotometry. --Determination of sulfur content in ferrosilicon using infrared absorption and barium sulfate gravimetric chromatography. The purpose is to measure the sulfur content in ferrosilicon. The content was determined using infrared absorption and barium sulfate gravimetric method with chromatographic separation. --Determination of Calcium Content in Ferrosilicon by Flame Atomic Absorption Spectrometry. The purpose is to measure the calcium content in ferrosilicon using flame atomic absorption spectrometry. Absorption spectroscopy. --Determination of Carbon Content in Ferrosilicon using Infrared Absorption Method. The purpose is to measure the carbon content in ferrosilicon using the infrared absorption

method. --Determination of Titanium Content in Ferrosilicon using Diantipyrrolidone Spectrophotometry. The purpose is to measure the titanium content in ferrosilicon using diantipyrrolidone spectrophotometry. Antipyrrolidine methane spectrophotometry. --Determination of lead, tin, arsenic, antimony, and bismuth content in ferrosilicon using inductively coupled plasma mass spectrometry (ICP-MS). The purpose is to measure... The content of lead, tin, arsenic, antimony and bismuth in ferrosilicon was determined by inductively coupled plasma mass spectrometry. Determination of silicon-iron-titanium content by diantipyrrolidone Spectrophotometry Warning - This document should be used by personnel with formal laboratory work experience. This document does not address all potential safety issues. Users are responsible for taking appropriate safety and health measures and ensuring compliance with relevant national regulations.

1 Scope

GB/T 4333.11-2025 is the Chinese national standard covering titanium in ferrosilicon by colorimetry - the decomposition, the reduction and the yellow complex formed with diantipyrylmethane, the interferences from iron and from the silicon matrix, and the measurement at the absorption maximum. Part 11 of the series, first edition, under the China Iron and Steel Association. In force from 1 May 2026. Issued on 31 October 2025, it has been in force since 1 May 2026.

2.Determining the repeatability of standard measurement methods Basic methods of sex and representation

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are listed below. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 4010 Sample collection and preparation for chemical analysis of ferroalloys

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

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

GB/T 6682 Specifications and test methods for water used in analytical laboratories

GB/T 7729 General Rules for Chemical Analysis of Metallurgical Products - Spectrophotometric Method

GB/T 8170 Rules for rounding off numerical values and the representation and

determination of limiting values

GB/T 12806 Laboratory Glassware - Single-mark volumetric flasks

GB/T 12807 Graduated Pipettes for Laboratory Glassware

GB/T 12808 Laboratory Glassware - Single-mark Pipettes

3 Terms and Definitions

This document does not contain any terms or definitions that need to be defined.

4.Principles The sample was decomposed using nitric acid, hydrofluoric acid, and sulfuric acid. A portion of the solution was then separated and, in hydrochloric acid medium, ascorbic acid was used to eliminate the colored ions of iron and chromium. Interference was eliminated. Titanium ions reacted with diantipyrin methane to form a yellow complex. The absorbance was measured at 385 nm, and the mass fraction of titanium was calculated.

5.Reagents Unless otherwise specified, only approved analytical grade reagents and distilled water of grade III or higher conforming to GB/T 6682 or equivalent should be used in the analysis. It is water of fairly high purity.