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

GB/T 12690.7-2021

Replacing GB/T 12690.7-2003

**Chemical analysis methods for non-rare earth impurities of rare
earth metals and their oxides - Part 7: Determination of silicon
content**

稀土金属及其氧化物中非稀土杂质化学分析方法 第7部分：硅量的测定

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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 of Standardization Documents" Drafting. This document is part 7 of GB/T 12690 "Chemical Analysis Methods of Non-rare Earth Impurities in Rare Earth Metals and Their Oxides". GB/T 12690 The following parts have been released.

- 1. Determination of Carbon and Sulfur Content High Frequency-Infrared Absorption Method;
- 2. Gravimetric method for determination of ignition loss in rare earth oxides;
- 3. Gravimetric method for the determination of water content in rare earth oxides;
- 4. Determination of oxygen and nitrogen content by pulse-infrared absorption method and pulse-thermal conductivity method;
- 5. Determination of cobalt, manganese, lead, nickel, copper, zinc, aluminum, chromium, magnesium, cadmium, vanadium and iron content;
- 6. Determination of iron content potassium thiocyanate, 1,10-phenanthroline spectrophotometry;
- 7. Determination of silicon content;
- 8. Determination of sodium content;
- 9. Determination of Chlorine Content Silver Nitrate Turbidimetric Method;
- 10. Determination of phosphorus content molybdenum blue spectrophotometry;
- 11. Determination of Magnesium Content Flame Atomic Absorption Spectrometry;
- 12. Determination of Thorium Content Arsenazo III Spectrophotometry and Inductively Coupled Plasma Mass Spectrometry;

1 Scope

GB/T 12690.7-2021 is the Chinese national standard on chemical analysis methods for non-rare earth impurities of rare earth metals and their oxides - part 7: determination of silicon content, in the field of metallurgy. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 11 October 2021 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 May 2022.

Classification: ICS 77.120.99, CCS H14. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document specifies the methods for determining the total silicon content in rare earth oxides and the acid-soluble silicon content in rare earth metals and their oxides. This document is applicable to the determination of the amount of silicon in rare earth metals and their oxides, including molybdenum blue spectrophotometry (method 1) and inductively coupled plasma Atomic Emission Spectroscopy (Method 2). Molybdenum blue spectrophotometry (method 1) is suitable for the total silicon content in rare earth oxides and rare earth metals and Determination of acid-soluble silicon content in its oxide, measurement range (mass fraction). 0.0010%~0.20%; inductively coupled plasma atomic emission Spectroscopy (Method 2) is suitable for the determination of acid-soluble silicon content in rare earth metals and their oxides, and the measurement range (mass fraction). 0.010%~ 0.20%. When the scope of analysis of the two methods in this document overlaps, method 1 should be preferred as the arbitration method.

2 Normative references

The content of the following documents constitutes an indispensable clause of this document through normative references in the text. Among them, dated quotations 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 8170 Numerical rounding rules and the expression and determination of limit values

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Fulsiliconcontent The content of silicon in rare earth oxides.

Note. Calculated based on the mass fraction of silica.

3.2 Acid soluble silicon content The content of silicon in rare earth metals and oxides that can be dissolved in acid solutions.

Note. Rare earth metals are calculated by the mass fraction of silicon; rare earth oxides are calculated by the mass fraction of silicon dioxide.

4 Molybdenum blue spectrophotometry (method 1)

4.1 Principle of the method When determining the total silicon content in rare earth oxides, the sample is melted with anhydrous sodium carbonate-boric acid mixed flux and leached with dilute nitric acid; determination of rare earth metals When the acid-soluble silicon content in its oxide, the sample is dissolved with dilute nitric acid. In the acidic medium of 0.12mol/L~0.25mol/L, silicon and molybdenum Ammonium acid generates silico-molybdenum heteropoly acid, decomposes phosphorus and arsenic heteropoly acid with grass-sulfur mixed acid, and uses ascorbic acid to reduce silico-molybdenum heteropoly acid to a blue low-valent complex. The absorbance was measured at a wavelength of 830nm with a spectrophotometer.