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

GB/T 47098-2026

**Refractory products - Determination of reduced species in
carbon containing refractories by XRD**

耐火材料 X射线衍射法测定含碳耐火材料中的还原性物质

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is modified to adopt ISO 23071:2021 "Refractory materials - Determination of reducing substances in carbon-containing refractories by X-ray diffraction".

Compared with ISO 23071:2021, this document has undergone many structural adjustments. A comparison table of the structural numbering changes between the two documents is provided.

See Appendix A.

This document differs significantly from ISO 23071:2021. The relevant clauses are indicated in vertical margins.

Single lines (?) are indicated. A summary of these technical differences and their causes can be found in Appendix B.

The following editorial changes have been made to this document.

---Note 3.1 has been deleted;

--- EN13925-3 (see 5.1) has been replaced with JB/T 9400 (referenced in this document).

---The heading has been removed and replaced with an untitled heading (see 7.4.2.2 and 7.5.1 of ISO 23071:2021);

---ISO 12677 has been replaced with GB/T 21114 (informative reference), and GB/T 16555 (informative reference) has been added (see 7.5.1);

---An informative appendix has been added (see Appendix C).

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 and is under the jurisdiction of the National Technical Committee on Standardization of Refractory Materials (SAC/TC193).

1 Scope

This document describes the determination of common additives in carbon-containing refractories using X-ray diffraction (XRD) with a Bragg-Brentano diffractometer.

Methods involving the addition of reducing agents or reaction products to mineral phases.

This document applies to the determination of reducing substances in carbon-containing refractory materials.

This document does not apply to the determination of reducing substances in refractory materials with silicon carbide as the main carbon source; for the detection methods, please refer to [link to relevant documentation].

EN12698-2.

Note: Common reducing agents include α -Si₃N₄, β -Si₃N₄, AlN, metallic aluminum, Al₄C₃, elemental silicon, boron carbide, and boron nitride, etc., and some refractory materials may also contain reducing agents.

It can contain other types of reducing substances, including Al₂O₃·AlN solid solution (i.e., Alon), Si₃N₄·SiO₂ solid solution and Si₃N₄·Al₂O₃ solid solution.

Sialons (solid solutions). Because the structures of these solid solution components are not yet clearly defined, their presence poses challenges to the identification and quantitative analysis of materials.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

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 4513.2 Unshaped refractories - Part 2: Sampling (GB/T 4513.2-2017, ISO 1927-2:2012, IDT) GB/T 10325 Sampling Inspection Rules for Acceptance of Shaped Refractory Products (GB/T 10325-2012, ISO 5022:1979, NEQ) GB/T 16555 Chemical Analysis Methods for Carbon-, Silicon Carbide and Nitride-Containing Refractory Materials GB/T 17617 Sampling Inspection Rules for Refractory Raw Materials (GB/T 17617-2018, ISO 8656-1:1988, MOD) GB/T 18930 Terminology for Refractory Materials (GB/T 18930-2020, ISO 836:2001, MOD)

3 Terms and Definitions

The terms and definitions defined in GB/T 18930 and the following terms and definitions apply to this document.

Refractory products with a carbon content exceeding 20%, wherein the carbon is mainly added during the manufacturing process in the form of graphite, pitch, tar, resin or similar materials.

X-ray diffraction; XRD X-rays are scattered by electrons in crystalline materials, and the coherent scattered light exhibits a diffraction phenomenon with enhanced interference along a specific direction.

Note: The diffraction patterns produced by each type of crystal reflect the atomic distribution pattern within the crystal. Based on Bragg's equation, when the constituent elements, groups, or structures of the crystal...

When there are differences in structure, the diffraction pattern will show variations in the number, angular position, relative intensity, and shape of diffraction peaks. XRD patterns, as a representation of crystal structure...

The basis for qualitative and quantitative analysis.