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

GB/T 32178-2015

**Refractory products and materials - Spectrometric
determination of chromium(VI) in chrome refractories**

分光法测定 含铬耐火材料中六价铬分析方法

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Quarantine;
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Foreword

This standard was drafted in accordance with GB/T 1.1-2009 given rules. Please note that some of the content of this document may involve patents. Release mechanism of the present document does not assume responsibility for the identification of these patents. This standard by the National Standardization Technical Committee Refractories (SAC/TC193) and focal points. This standard is mainly drafted by: Sinosteel Luoyang Institute of Refractories Co., Ltd., Beijing Lier High Temperature Materials Co., Ltd. The main drafters of this standard. Caohai Jie, Zhao Ji increase, Zhangzhou Ming, Han Dan, Liu Li, Huang Fei, Wang Hui, Sunshou Qi. Hexavalent chromium-containing refractories Spectrophotometry

1 Scope

China's national spectrometric method for determining hexavalent chromium in chrome-containing refractories. It specifies the test principle, the apparatus, the reagents, the sample preparation, the procedure and the calculation, and it applies to the determination of hexavalent chromium up to 500 micrograms per gram, extendable to 1250 micrograms per gram if the aliquot taken is reduced. Chrome refractories are used where nothing else survives: the working lining of a coal gasifier, glass tank sidewalls, non-ferrous smelting furnaces and other environments in which slag or melt would dissolve any other oxide. Chromium in them is present as chromium(III), which is stable, insoluble and of low toxicity. The problem is that under oxidising conditions at high temperature, particularly in the presence of alkalis, some of that chromium(III) is oxidised to chromium(VI) - and chromium(VI) is an entirely different substance. It is soluble in water, it is readily absorbed through skin and lungs, and it is a confirmed human carcinogen. So a refractory that was harmless when installed can, after service, contain a soluble carcinogen, and the question

arises exactly when the lining is demolished and the used brick is handled, crushed and disposed of or recycled. This method is how that is measured. The chemistry exploits the difference between the two oxidation states directly: an alkaline solution of sodium hydroxide and sodium carbonate dissolves chromium(VI) while leaving chromium(III) undissolved, so the separation is achieved by the dissolution itself. The dissolved chromium(VI) then forms a violet complex with diphenylcarbazide, measured by spectrophotometer between 540 and 550 nanometres. Issued on 10 December 2015 and in force since 1 January 2017.

This standard specifies the method for the determination spectroscopy for chemical analysis of chromium-containing refractories of hexavalent chromium. This standard applies to the determination of hexavalent chromium range of less than 500 $\mu\text{g/g}$. NOTE. If the dispensing amount is reduced to 10mL, the measure extended to 1250 $\mu\text{g/g}$.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version suitable for use herein Member. For undated references, the latest edition (including any amendments) applies to this document. Laboratory use specifications and test methods GB/T 6682 Analysis

3 Test principle

Sample hexavalent chromium hydroxide and sodium carbonate dissolved in a mixed solution of trivalent chromium is not dissolved in this alkaline solution, ammonia dissolved hexavalent chromium and diphenyl Urea generated purple color, absorbance was measured in a spectrophotometer at a wavelength of 540nm ~ 550nm.

4 Device

- 4.1 Analytical balance (the amount being 0.1mg).
- 4.2 Glass Container, A Class.
- 4.3 Spectrophotometer.
- 4.4 automatic temperature control oven.
- 4.5 heating magnetic stirrer.

5 Reagents

5.1 General Reagents were of analytical grade, water conductivity lower than 2 $\mu\text{S/cm}$ of water, or in compliance with GB/T 6682 requirements in third grade water. There are commercially available Permit the solution can also be used.

5.2 alkali solution Weigh 30g of sodium carbonate, 20g of sodium hydroxide dissolved in water, the volume 1000mL, and mix, using a formulation today.

5.3 Hexavalent chromium storage solution The benchmark potassium dichromate reagent at $110\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$ drying, weighed 0.3536g dissolved in 200mL of water, the volume 500mL, and mix. This solution is a chromium content of 250mg/L.

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