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GB/T 5124.5-2024

Methods for chemical analysis of hardmetals-Part 5: Determination of tantalum and niobium content-Inductively coupled plasma emission spectrometry

硬质合金化学分析方法 第5部分：钽、铌含量的测定 电感耦合等离子体发射光谱法

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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 for standardization documents" Drafting.

This document is Part 5 of GB/T 5124 Chemical analysis methods for cemented carbide. GB/T 5124 has been published in the following parts.

- Part 1: Determination of total carbon content - Gravimetric method;

- Part 2: Determination of insoluble (free) carbon content - Gravimetric method;

- Part 3: Determination of cobalt content - Potentiometric titration method;

- Part 4: Determination of titanium content - Hydrogen peroxide spectrophotometric method;

- Part 5: Determination of tantalum and niobium content - Inductively coupled plasma optical emission spectrometry.

Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents.

This document is proposed by China Nonferrous Metals Industry Association.

This document is under the jurisdiction of the National Technical Committee on Standardization of Nonferrous Metals (SAC/TC243).

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Introduction

Cemented carbide has high hardness, strength, wear resistance and corrosion resistance, and is widely used in the manufacture of cutting tools, drilling tools, wear-resistant parts, etc.

It is used in military industry, aerospace, mechanical processing, oil drilling, mining tools and other fields. Adding tantalum or niobium can increase the hardness and Wear resistance, therefore, cemented carbide with tantalum or niobium added is becoming more and more popular and its consumption is increasing.

Therefore, it is necessary to establish an analytical standard for the chemical composition of tantalum and niobium in cemented carbide to improve the quality control and performance of the material.

GB/T 5124 Chemical Analysis Methods for Cemented Carbide is to be published by It consists of five parts.

- Part 1: Gravimetric method for determination of total carbon content. The purpose is to establish a method for the determination of total carbon content.

- Part 2: Determination of insoluble (free) carbon content - Gravimetric method. The purpose is to establish a method for the determination of insoluble (free) carbon content.

- Part 3: Determination of cobalt content - Potentiometric titration method. The purpose is to establish a method for the determination of cobalt content.

- Part 4: Determination of titanium content - Hydrogen peroxide spectrophotometric method. The purpose is to establish a method for the determination of titanium content.

- Part 5: Determination of tantalum and niobium content - Inductively coupled plasma emission spectrometry. The purpose is to establish the determination of tantalum and niobium content. Determine the method.

This document fully investigates domestic and foreign cemented carbide related product standards and the actual needs of cemented carbide analysis and testing in the industry,

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and expands the scope of cemented carbide The application field of the determination method of tantalum and niobium in cemented carbide has improved the versatility and standardization of the determination method of tantalum and niobium in cemented carbide industry.

Standardization level, "Chemical analysis methods for cemented carbide Part 5: Determination of tantalum and niobium content - Inductively coupled plasma optical emission spectrometry" The formulation of this standard has positive guiding significance for improving the analysis method of cemented carbide components and improving the quality control capability of cemented carbide production.

Chemical analysis methods for cemented carbide Part 5: Determination of tantalum and niobium content Inductively Coupled Plasma Optical Emission Spectrometry

1 Scope

This document specifies the method for the determination of tantalum and niobium content in cemented carbide by inductively coupled plasma optical emission spectrometry.

This document is applicable to the determination of tantalum and niobium content in tungsten-based mixed powder and cemented carbide. Tantalum (Ta) content determination range. 0.050%~ 15.00%; Niobium (Nb) content (mass fraction) determination range. 0.050%~5.00%.

2 Normative references

GB/T 6682

GB/T 8170

GB/T 17433

3 Terms and Definitions

The terms and definitions defined in GB/T 17433 apply to this document.

4 Principles

The sample was dissolved in hydrofluoric acid-nitric acid, and the emission intensity of each element was measured on an inductively coupled plasma atomic emission spectrometer.

The standard working curve was drawn by volume matching, and the mass fraction of each element was calculated according to the standard working curve method.

5 Reagents and Materials

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Unless otherwise stated, only reagents of confirmed high-grade purity were used in the analyses.

5.1 Water, GB/T 6682, Grade 3.

5.2 High purity tungsten powder (wW>=99.99%).

5.3 Hydrofluoric acid (rho = 1.14 g/mL).

5.4 Nitric acid (rho=1.42 g/mL).

5.5 Standard stock solution. Use certified reference materials with a mass concentration of 1000 μg/mL for both tantalum and niobium.

5.6 Tantalum standard solution. Pipette 10 mL of the tantalum standard stock solution (5.5) into a 100 mL plastic volumetric flask, add 2 mL of nitric acid (5.4), 1 mL of hydrofluoric acid (5.3) is diluted to the mark with water and mixed. 1 mL of this solution contains 100 μg of tantalum.

5.7 Niobium standard solution. Pipette 10 mL of the niobium standard stock solution (5.5) into a 100 mL plastic volumetric flask, add 2 mL of nitric acid (5.4),

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