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

GB/T 5124.2-2026

Replacing GB/T 5124.2-2008

**Methods for chemical analysis of hardmetals - Part 2:
Determination of insoluble(free) carbon content - Gravimetric
method and gas volumetric method**

硬质合金化学分析方法 第2部分：不溶(游离)碳量的测定 重量法和气体容量法
(English Translation)

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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 2 of GB/T 5124 "Chemical Analysis Methods for Hard Alloys". GB/T 5124 has already published the following parts.

- Part 1: Determination of Total Carbon by Gravimetric and Gas Volumetric Methods;
- Part 2: Determination of insoluble (free) carbon by gravimetric and gas volumetric methods;
- Part 3: Determination of Cobalt Content by Potentiometric Titration;
- Part 4: Determination of Titanium Content by Hydrogen Peroxide Spectrophotometry;
- Part 5: Determination of Tantalum and Niobium Content by Inductively Coupled Plasma Atomic Emission Spectrometry this document replaces GB/T 5124.2-2008 "Chemical Analysis Methods for Cemented Carbide - Determination of Insoluble (Free) Carbon Content by Gravimetric Method".

Compared with GB/T 5124.2-2008, apart from structural adjustments and editorial changes, the main technical changes are as follows.

- a) The scope has been changed (see Chapter 1, Chapter 1 of the 2008 edition);
- b) The weight method has been changed (see 4.1, Chapters 3-8 of the 2008 edition);
- c) The gas volumetric method has been added (see 4.2).

This document was drafted with reference to ISO 3908:2009 "Determination of insoluble

(free) carbon content in cemented carbides by gravimetric method", and its degree of consistency is non-standard.

Equivalent.

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 Nonferrous Metals Industry Association.

This document is under the jurisdiction of the National Technical Committee on Standardization of Nonferrous Metals (SAC/TC 243).

Introduction

Hard alloys possess a series of excellent properties, including high hardness, wear resistance, good strength and toughness, heat resistance, corrosion resistance, and a low coefficient of thermal expansion.

It is used in the manufacture of cutting tools, drills, wear-resistant parts, etc., and is widely used in aerospace, machining, oil drilling, mining tools, and mold manufacturing.

In fields such as...

GB/T 5124, "Chemical Analysis Methods for Cemented Carbide," aims to establish a complete set of standards for chemical analysis methods of cemented carbide, and is proposed to consist of six...

Partial composition.

--Part 1: Determination of Total Carbon by Gravimetric and Gas Volumetric Methods. The aim is to establish the determination of total carbon content.

--Part 2: Determination of Insoluble (Free) Carbon by Gravimetric and Volumetric Methods. The aim is to establish the content of insoluble (free) carbon.

The determination.

--Part 3: Determination of Cobalt Content by Potentiometric Titration. The purpose is to establish a method for determining cobalt content.

--Part 4: Determination of Titanium Content by Hydrogen Peroxide Spectrophotometry. The purpose is to establish a method for determining titanium content.

--Part 5: Determination of Tantalum and Niobium Content by Inductively Coupled Plasma Atomic Emission Spectrometry. The aim is to establish the determination of tantalum and niobium content...

Measurement.

--Part 6: Determination of Cobalt, Nickel, Iron, Manganese, Titanium, Vanadium, Molybdenum, and Chromium Contents by Flame Atomic Absorption Spectrometry. The aim is to establish the determination of the content of cobalt, nickel, iron, manganese, titanium, vanadium, molybdenum, and chromium.

Determination of the contents of nickel, iron, manganese, titanium, vanadium, molybdenum and chromium.

Carbon content is one of the key factors affecting the properties of cemented carbide. Even slight fluctuations in carbon content can affect the phase composition and microstructure of cemented carbide.

Changes in the structure of the alloy affect its properties. When the carbon content is high, free graphite will appear inside, which affects the bending strength of the cemented carbide.

Toughness and wear resistance are negatively affected. This document describes a method for determining the free carbon content in cemented carbide, based on the existing gravimetric method.

The method incorporates a gas volumetric method with high measurement precision and stability, offering advanced technology, operability, and wide applicability. This contributes to the improvement of hard-compound...

The gold composition analysis method has positive guiding significance for improving the quality control capability of cemented carbide production.

Chemical Analysis Methods for Hard Alloys Part 2: Determination of Insoluble (Free) Carbon Content Gravimetric method and gas volumetric method

1 Scope

This document describes methods for determining the amount of insoluble (free) carbon in cemented carbide using gravimetric and gas volumetric methods.

This document applies to the determination of insoluble (free) carbon content in cemented carbides (excluding chromium carbide). The gravimetric determination range is 0.02%~0.50%; the determination range of the gas volumetric method is 0.02%~1.20%. The determination of insoluble (free) carbon in carbides can be performed according to the procedure (chromium carbide).

except).

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 5124.1 Chemical analysis methods for cemented carbide - Part 1: Determination of total carbon content by gravimetric and gas volumetric methods GB/T 8170 Rules for rounding off numerical values and the representation and determination of limiting values

3 Terms and Definitions

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

4.1.1 Principle

The sample was decomposed with nitric acid-hydrofluoric acid, but the free carbon was not dissolved. It was then filtered using an acid-washed asbestos mat (or a special ceramic filter crucible) and rinsed with hot water.

Acid washing separates free carbon from combined carbon. Carbon is then oxidized to carbon dioxide in a high-temperature, pure oxygen stream, with flux added if necessary.

The carbon dioxide produced is carried by oxygen to a pre-contained absorption bottle where it is absorbed by caustic soda and asbestos. The increase in the amount of caustic soda and asbestos is measured, and this value represents the amount of carbon dioxide produced.

Carbon dioxide levels.

4.1.2 Reagents or materials

4.1.2.1

Nitric acid. 2,000 mL of nitric acid ($\rho=1.42$ g/mL) in 3,000 mL of water.

4.1.2.2

Hydrofluoric acid ($\rho=1.15$ g/mL).

4.1.2.3

Pickled asbestos mat. Before use, ignite in a muffle furnace at 800 °C for 8 h, remove and cool, then store in an unoled desiccator for later use.

(The same treatment is required if using a special ceramic filter crucible).

4.1.2.4

Porcelain boat. Made of refractory material, 80 mm~100 mm long, 12 mm~14 mm wide, and 8 mm~9 mm deep. (Preliminary testing is required.) at the specified temperature, treat in an oxygen stream for 10 minutes, or calcine at 800°C~1000°C for 8 hours. The pretreated