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

GB/T 5124.1-2026

Replacing GB/T 5124.1-2008

**Methods for chemical analysis of hardmetals - Part 1:
Determination of total carbon content - Gravimetric method and
gas volumetric method**

硬质合金化学分析方法 第1部分：总碳量的测定 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 1 of GB/T 5124, "Chemical Analysis Methods for Cemented Carbide". GB/T 5124 has the following parts published.

--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 supersedes GB/T 5124.1-2008 "Chemical Analysis Methods for Cemented Carbide - Determination of Total Carbon Content by Gravimetric Method", and is consistent with GB/T 5124.1-2008, aside 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 gravimetric method has been modified (see 4.1, Chapters 2-7 of the 2008 edition);
- c) The gas volumetric method has been added (see 4.2).

This document was drafted with reference to ISO 3907:2009 "Determination of total carbon content in cemented carbide by gravimetric method", and its degree of consistency is non-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 alloy phase composition and microstructure.

Changes in carbon content can affect the alloy's properties. Insufficient carbon content can lead to decarburization, resulting in decreased strength and reduced performance during use.

It is prone to fracture and chipping. When the carbon content is high, free graphite will appear inside, which affects the bending strength, toughness, and wear resistance of cemented carbide.

All of these have adverse effects. This document describes a method for determining the total carbon content in cemented carbide, which improves the measurement precision based on the original gravimetric method.

The gas volumetric method, characterized by high accuracy and stability, possesses advanced technology, operability, and wide applicability. It contributes to improving the methods for analyzing the composition of cemented carbides.

This method has positive guiding significance for improving the quality control capabilities of cemented carbide production.

Chemical Analysis Methods for Hard Alloys Part 1: Determination of Total Carbon Content
Gravimetric method and gas volumetric method

1 Scope

This document describes methods for determining the total carbon content in cemented carbide using gravimetric and gas volumetric methods.

This document applies to the determination of total carbon content in cemented carbide. The gravimetric method is used for determinations where the total carbon content (mass fraction) is not less than 4.00%; for gases...

The volumetric method is used to determine the total carbon content (mass fraction) in the range of 3.00% to 30.00%. The determination of total carbon content in carbides can be performed using the same method.

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 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

In a high-temperature, pure oxygen stream, carbon is oxidized to carbon dioxide, with flux added if necessary. The generated carbon dioxide is carried by the oxygen to the already...

A constant amount of caustic soda and asbestos is absorbed in an absorption bottle. The increase in the amount of caustic soda and asbestos is measured, and its value is the amount of carbon dioxide generated.

4.1.2 Reagents and Materials

4.1.2.1

Anhydrous magnesium perchlorate. analytical grade.

Note: Strong oxidizing agent; can form explosive mixtures with reducing agents, organic matter, and flammable materials.

4.1.2.2

Caustic soda asbestos. analytical grade.

4.1.2.3

Fluxes. such as metallic tin, metallic copper, oxide, and metallic iron.

4.1.2.4

Oxygen. volume fraction greater than 99%.

4.1.2.5

Ceramic tube. Made of non-porous refractory material, with an inner diameter of 18 mm to 30 mm and a length of at least 650 mm, to facilitate operation.

The temperature at the end of the combustion tube during the process should not exceed 60 °C.