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# GB/T 223.74-1997

# Methods for chemical analysis of iron, steel and alloy - The combustion gravimetric/gas-volumetric method for the determination of non-combined carbon content

钢铁及合金化学分析方法 非化合碳含量的测定

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# Table of Contents

# Foreword

This standard was revised from GB 223.74-91 "Methods for chemical analysis of iron, steel and alloy - The combustion gravimetric/gasometric method for the determination of non-combined carbon content", in accordance with the National Standard of the People's Republic of China GB/T 1.1-1993 "Directives for the work of standardization - Unit 1: Drafting and presentation of standards - Part 1: General rules for drafting standards" and GB 1.4-88 "Directives for the work of standardization - Rules for drafting chemical analysis standards".

According to the provisions of 4.2.3 and 4.3.3 of Chapter 4 in GB/T 1.1-1993 and the provisions of 6.10 of Chapter 6 of GB/T 1.4-88, in this revision, ADD the "Foreword", Chapter 2 "Normative references", Chapter 6 "Sampling and specimen preparation".

This standard will replace GB 223.74-91 from the effective date.

This standard was proposed by the Ministry of Metallurgical Industry of the People's Republic of China.

This standard shall be under the technical jurisdiction of the National Steel Standardization Technical Committee.

Drafting organizations of this standard: Iron and Steel Research Institute of the Ministry of Metallurgical Industry, Anshan Iron and Steel Company, Shanghai Metallurgical Equipment General Plant.

The main drafters of this standard: Wang Yuxing, Jin Shenghui, Liu Guangzhi, Cui Qiuhong.

This standard was first released in 1981 as GB 223.1 (3)-81. It was revised in 1991 as GB 223.74-91, wherein the method precision was determined.

**Correction of GB/T 223.74-1997 "Methods for chemical analysis of iron, steel and alloy - The combustion gravimetric/gas-volumetric method for the determination of combined carbon content"**

The word "combined" in the English Title is changed into "non-combined" for cover-page and 1st page.

# Methods for chemical analysis of iron, steel and alloy - The combustion gravimetric/gas-volumetric method for the determination of non-combined carbon content

**GB/T 223.74-1997**
Replacing GB 223.74-91

## 1 Scope

This standard specifies the determination of non-combined carbon content, using the post-combustion gravimetric method in a pipe furnace or the post-combustion gas volume method in a pipe furnace.

This standard is applicable to the determination of 0.030% (m/m) ~ 5.00% (m/m) non-combined carbon content in iron and carbon steel.

## 2 Normative references

The following standards contain provisions that, through reference in this standard, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties using this standard shall explore the possibility of using the latest version of the following standards.

GB 222-84 Method of sampling steel for determination of chemical composition and permissible variations for product analysis

GB/T 223.71-1997 Methods for chemical analysis of iron, steel and alloy - The gravimetric method after combustion in the pipe furnace for the determination of carbon content

GB/T 223.69-1997 Methods for chemical analysis of iron, steel and alloy - The gas-volumetric method after combustion in the pipe furnace for the determination of carbon content

## 3 Method summary

After the sample is dissolved in dilute nitric acid, the non-combined carbon is filtered out. The non-compounded carbon is washed by dilute alkali solution, dilute hydrochloric acid solution, water respectively. Then it is dried. According to the content of non-combined carbon in the sample, choose the post-combustion gravimetric method

in the pipe furnace or the post-combustion gas volume method in the pipe furnace for measurement.

## 4 Reagents and materials

**4.1** Acid-washed asbestos: It is treated with oxygen at a high temperature of 1000 °C and then stored in isolation from air.

**4.2** Hydrofluoric acid (ρ 1.15 g/mL).

**4.3** Nitric acid (1 + 1). Diluted with nitric acid (ρ 1.42 g/mL).

**4.4** Hydrochloric acid (5 + 95). Diluted with hydrochloric acid (ρ 1.18 g/mL).

**4.5** Sodium hydroxide solution 50 g/L.

**4.6** Silver nitrate solution 10 g/L.

Weigh 1 g of silver nitrate and dissolve it in 100 mL of dilute nitric acid (1 + 100), which is diluted from nitric acid (ρ 1.42 g/mL).

## 5 Instruments and equipment

**5.1** Gouch's crucible: 20 mL.

**5.2** Porcelain boat: Length 97 mm. Before use, it needs to be burned in a high-temperature furnace of 1000 °C for more than 1 hour. After cooling, it is stored in an ungreased dryer, which contains alkali asbestos or soda lime and anhydrous calcium chloride, for later use.

## 6 Sampling and specimen preparation

Take samples and prepare specimen, according to GB 222 or appropriate national standards for iron.

## 7 Analytical procedures

Safety instructions: For combustion analysis, the main dangers are from pre-combustion of the porcelain boat and burns during melting. Whenever the porcelain boat is removed during analysis, it must use tweezers and a suitable container to contain it. Formal precautions must be taken when operating oxygen cylinders. Since high concentrations of oxygen in narrow spaces may cause fire hazards, the oxygen during combustion must be effectively discharged from the equipment.

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