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

中华人民共和国国家标准

GB/T 5121.1-2008

Replace GB/T 5121.1-1996

**Methods for chemical analysis of copper and
copper alloys—Part 1: Determination of copper
content**

铜及铜合金化学分析方法 第 1 部分：铜含量的测定

(ISO 1554: 1976, ISO 1553: 1976, Wrought and cast copper alloys and unalloyed copper
containing not less than 99,90% of copper— Determination of copper
content—Electrolytic method, MOD)

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Foreword

There are 27 parts for GB/T 5121 *Methods for Chemical Analysis of Copper and Copper Alloy*.

- Part 1: Determination of copper content
- Part 2: Determination of phosphorus content
- Part 3: Determination of Pb content
- Part 4: Determination of carbon content and sulfur content
- Part 5: Determination of nickel content
- Part 6: Determination of Bi Content
- Part 7: Determination of As content
- Part 8: Determination of oxygen content
- Part 9: Determination of iron content
- Part 10: Determination of Sn content
- Part 11: Determination of Zn content
- Part 12: Determination of Sb content
- Part 13: Determination of Mn content
- Part 14: Determination of Mn content
- Part 15: 5.11Determination of Co content
- Part 16: Determination of Cr content
- Part 17: Determination of Be content
- Part 18: Determination of Mg content
- Part 19: Determination of Ag content
- Part 20: Determination of Zr content
- Part 21: Determination of Ti content
- Part 22: Determination of Cd content
- Part 23: Determination of Si content
- Part 24: Determination of Se content and Te content
- Part 25: Determination of B Content
- Part 26: Determination of Hg content
- Part 27: Inductively coupled plasma - atomic emission spectrometry.

This part is Part 1.

This part includes Method I, Method II and Method III.

Method I of this part modifies and adopts ISO 1554:1976 *Processing and Casting of Copper Alloy—Determination of Copper Content—Electrolytic Method*. It is the same with ISO 1554:1976 on the main technical content while the writing structure is not completely corresponding with each other. Refer to Annex A and Annex B for specific technical differences.

Method III of this part adopts ISO 1553:1976 *Determination of Copper Content for Pure Copper ($\geq 99.90\%$)—Electrolytic Method*. It is the same with ISO 1553:1976 on the main technical content while the writing structure is not completely corresponding with each other. Refer to Annex C and Annex D for specific technical differences.

This part substitutes GB/T 5121.1—1996 *Methods for Chemical Analysis of Copper and Copper Alloy- Determination of Copper Content*.

Compared with GB/T 5121.1—1996, the main changes of this part are as follows:

——Method I is the revision of “Method 1 Electrolytic-Atomic Absorption Spectrometric Method” in GB/T 5121.1—1996, supplementing Quality Assurance and Control provisions and adding Precision Provision;

——Added Method II: Potassium Permanganate Tellurium Oxide-Electrolytic-Atomic Absorption Spectrometric Method; only applicable to the determination of copper content in Cu-Te alloy;

——Method III is the revision of “Method 2 Electrolytic- Spectrophotometric Method” in GB/T 5121.1—1996, supplementing Quality Assurance and Control provisions and adding Precision provision;

Annexes A, B, C and D of this part are regarded as informative annexes.

This Part is proposed by China Nonferrous Metals Industry Association.

This Part is under the jurisdiction of the National Standardization Technology Committee on Nonferrous Metals.

Chinalco Luoyang Copper Co., Ltd., Beijing General Research Institute of Mining & Metallurgy and Institute of China Nonferrous Metals Industry Standard, Metrology and Quality are responsible for the drafting of this part.

This part is drafted by Chinalco Luoyang Copper Co., Ltd..

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Main verifiers of Method II: Liu Fang, Shen Guangxin, Gao Xinxiu, and Yang Hongsheng.

Main drafters of Method III: Xia Qingzhu and Ji Dehou.

Main verifiers of Method III: Liu Fang, Yang Bohua, Gao Xinxiu, Niu Jinzai.

The different release conditions of the standards substituted by this part are as follows:

——GB/T 5121.1—1996.

Methods for chemical analysis of copper and copper alloys—

Part 1: Determination of copper content

1 Method I Direct Electrolytic-Atomic Absorption Spectrometric Method

1.1 Scope

This part stipulates the determination method for copper content in copper and copper alloy.

This part applies to the determination for copper content in copper and copper alloy.

Determination scope: 50.00%-99.00%.

1.2 Method principle

After the dissolution of the specimen with nitric acid and hydrofluoric acid, use hydrogen peroxide to reduce oxides of nitrogen. Add lead to reduce the loss of platinum on the anode. Electrolyze to make the copper separate out on the platinum cathode. Weigh after cathode drying Use the flame atomic absorption spectrometric method to determine the residual copper content in the electrolyte.

1.3 Reagent

Unless otherwise specified, only reagent recognized as analytically pure and distilled water or deionized water or water of equal purity are used in analysis.

1.3.1 Absolute ethyl alcohol.

1.3.2 hydrofluoric acid (ρ₂₀ 1.13 g/mL).

1.3.3 Nitric acid (1+1).

1.3.4 Hydrogen peroxide (1+9).

1.3.5 Ammonium chloride solution:

1.3.6 Lead nitrate solution:

1.3.7 Copper standard storage solution: Weigh the fine copper of 1.0000g (the copper mass fraction≥99.95%) and put it into the beaker of 250mL. Add nitric acid (1.3.3) of 40mL and cover the watch glass. Heat until they are completely dissolved. Boil and remove oxides of nitrogen and wash the watch glass and the beaker with water and cool them. Place in a 1000mL volumetric flask, dilute with water to the scale and evenly mix it. 1mL of the solution contains the copper of 1mg.

1.3.8 Copper standard solution: Take 10.00mL copper standard storage solution (1.3.7)



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