

Translated English of Chinese Standard: GB/T4103.14-2009

Translated by: www.ChineseStandard.net

Wayne Zheng et al.

Email: Sales@ChineseStandard.net

GB

National Standard of the People's Republic of China

GB/T 4103.14-2009

Methods for chemical analysis of lead and lead
alloys - Part 14: Determination of cadmium content
- Flame atomic absorption spectrophotometry

GB/T 4103.14-2009 How to BUY & immediately GET a full-copy of this standard?

1. www.ChineseStandard.net;
2. Search --> Add to Cart --> Checkout (3-steps);
3. No action is required - Full-copy of this standard will be automatically & immediately delivered to your EMAIL address in 0~25 minutes.
4. Support: Sales@ChineseStandard.net. Wayne, Sales manager

Issued on: April 8, 2009

Implemented on: February 1, 2010

Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of People's Republic of China;
China National Standardization Management Committee

Table of Contents

Preface	3
1 Scope	5
2 Methods and Principles	5
3 Reagents	5
4 Instruments	6
5 Analytical Steps	7
6 Calculation of analytical results	8
7 Precision	9
8 Quality assurance and control	10
References and Original Chinese Documents	11

Preface

GB/T 4103 " Methods for chemical analysis of lead and lead alloys" is divided into 16 parts:

Part 1: Determination of tin content;

Part 2: Determination of antimony content;

Part 3: Determination of copper content;

Part 4: Determination of iron content;

Part 5: Determination of bismuth content;

Part 6: Determination of arsenic content;

Part 7: Determination of selenium content;

Part 8: Determination of tellurium content;

Part 9: Determination of calcium content;

Part 10: Determination of silver content;

Part 11: Determination of zinc content;

Part 12: Determination of thallium content;

Part 13: Determination of aluminum content;

Part 14: Determination of cadmium content - Flame atomic absorption spectrophotometry;

Part 15: Determination of nickel content - Flame atomic absorption spectrometry;

Part 16: Determination of copper, silver, bismuth, arsenic, antimony, tin, zinc contents - Photoelectric direct-reading emission spectroscopy.

This is Part 14.

This Part was proposed by the China Nonferrous Metals Industry Association.

This part is administered by the National Standardization Technical Committee for nonferrous metals.

The responsible drafting organizations of the Part: Zhuzhou Smelter Group Co., Ltd., and Henan Yuguang Gold & Lead Co., Ltd.

The participated drafting organizations of the Part: Shenzhen Lingnan Nonferrous Metals Corporation Limited Shaoguan smelter, MCC Huludao Nonferrous Metals Group, Shaanxi Dongling Zinc Industry Co., Ltd..

The main drafters of this Part: Zhong Yong, Zong Pu, the De Lei, Kong Jianmin, Li Lijun, Liu Yingjing, painted red, Yang Yan, Liu Limin, and Wang Honggang.

Methods for chemical analysis of lead and lead alloys

Part 14: Determination of cadmium content

Flame atomic absorption spectrophotometry

1 Scope

This Part of GB/T 4103 specifies the determination of cadmium content in lead and lead-cadmium alloys.

This Part applies to the determination of cadmium content in lead and lead-cadmium alloys.

Measuring range: 0.000 1% -0.01%; 0.3% – 2.0%.

2 Methods and Principles

Samples shall be dissolved in nitrate; USE lead sulfate to precipitate and separate lead; USE air-acetylene flame, at wavelength 228.8 nm of atomic absorption spectrometer, to measure absorbance of cadmium. USE standard curve method to calculate cadmium content.

3 Reagents

Unless otherwise stated, water used to prepare the solution and analysis in this test shall be Grade 1 Water; all test utensils used in the test shall be immersed with dilute nitrate (1 + 4), and shall be thoroughly washed with Grade 1 Water.

3.1 Nitrate (ρ 1.42 g / mL), superior grade purity.

3.2 Sulfate (ρ 1.84 g / mL); superior grade purity.

3.3 Nitrate (1 + 1).

3.4 Nitrate (1 + 3).

3.5 Sulfate (1 + 1).

3.6 Cadmium standard storage solution: WEIGH 0.500 0 g of metal cadmium (mass fraction of cadmium $\geq$ 99.99%) into 250 mL beaker; ADD 20 mL of nitrate

(3.1); COVER with watch glass; HEAT it until completely dissolved; BOIL to expel nitrogen oxides; COOL it; MOVE into 1 000 mL volumetric flask; USE water to dilute the volume to the mark; SHAKE well. 1 mL of this solution contains 0.5 mg of cadmium.

3.7 Cadmium standard solution: PIPETTE 10.00 mL of cadmium standard storage solution (3.6) into 500 mL volumetric flask; ADD 20 mL of nitrate (3.3); USE water to dilute the volume to the mark; MIX well; 1 mL of this solution contains 10 µg of cadmium.

4 Instruments

Atomic absorption spectrometer, attached with cadmium hollow cathode lamp. Under the optimum working conditions; those instruments which can achieve the following targets may be used.

- **Characteristic concentration:** In solution consistent with the matrix of measuring sample solution, the characteristic concentration of cadmium shall be less than 0.05 µg / mL;
- **Precision:** USE standard solution of the highest concentration to measure absorbance for 10 times, its standard deviation shall not exceed 1.0% of the average absorbance; USE standard solution of the lowest concentration (not the standard solution of “zero” concentration) to measure absorbance for 10 times, its standard deviation shall not exceed 0.5% of the average absorbance of standard solution of the highest concentration;
- **Linearity of working curve:** DIVIDE the working curve into five sections equally, based on concentration; the ratio between the absorbance difference of the highest section AND the absorbance difference of the lowest section shall not be less than 0.8;

Reference operating conditions of the instruments are shown in Table 1.

Table 4

Mass factor of cadmium / %	0.0002	0.0020	0.0050	0.50	1.00	1.50
R / %	0.0001	0.0005	0.0010	0.04	0.05	0.06
Note: Reproducibility (R) is $2.8S_R$; S_R is the reproducibility standard deviation.						

8 Quality assurance and control

Standard samples of national-level or industrial-level shall be used (when these 2 samples are not available, controlled standard sample may be used for substitution); effectiveness of this analytical method shall be calibrated weekly or biweekly. When the process is out of control, root cause shall be found out; After the error is corrected, calibration shall be repeated.

References and Original Chinese Documents

[1] GB/T 4103.14-2009 Methods for chemical analysis of lead and lead alloys - Part 14: Determination of cadmium content - Flame atomic absorption spectrophotometry. <http://www.chinesestandard.net/Default.aspx?PDF-English-ID=GB/T%204103.14-2009>

This is an excerpt of the PDF (Some pages are marked off intentionally)

Full-copy PDF can be purchased from 1 of 2 websites:

1. <https://www.ChineseStandard.us>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Select your country (currency), for example: USA (USD); Germany (Euro).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Tax invoice can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with download links).

2. <https://www.ChineseStandard.net>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Add to cart. Only accept USD (other currencies - <https://www.ChineseStandard.us>).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with PDFs attached, invoice and download links).

Translated by: Field Test Asia Pte. Ltd. (Incorporated & taxed in Singapore. Tax ID: 201302277C)

About Us (Goodwill, Policies, Fair Trading...): <https://www.chinesestandard.net/AboutUs.aspx>

Contact: Wayne Zheng, Sales@ChineseStandard.net

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

----- The End -----