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

**GB/T 12689.1-2010**

Replacing GB/T 12689.1-2004

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**Methods for chemical analysis of zinc and zinc alloys -- Part 1: Determination of  
aluminum content -- Chrome azurol S-polyethylene glycol octyl phenyl ether-ethyl  
pyridine bromine spectrophotometry, Chrome azurol S spectrophotometric method and  
EDTA titri**

锌及锌合金化学分析方法 第1部分：铝量的测定 铬天青S-聚乙二醇辛基苯基醚-溴  
化十六烷基吡啶分光光度法、CAS分光光度法和E

**(English Translation)**

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## Table of Contents

Foreword

1.1 Scope

1.2 Principle of the method

1.3 Reagents

### Foreword

GB/T 12689-2010 "Methods for chemical analysis of zinc and zinc alloy" is divided into 13 parts.

--- Part 1. Determination of the amount of chrome aluminum azure S- octyl polyethylene glycol phenyl ether - cetylpyridinium bromide, spectrophotometry, CAS Spectrophotometry and EDTA titration;

--- Part 2. Determination of arsenic content by atomic fluorescence spectrometry;

--- Part 3. Determination of cadmium content by flame atomic absorption spectrometry;

--- Part 4. Determination of the amount of copper diethyl dithiocarbamate lead spectrophotometry, flame atomic absorption spectrometry and electric solution;

--- Part 5. Determination of iron content sulfosalicylic acid spectrophotometric method and the flame atomic absorption spectrometry;

--- Part 6. Determination of lead content oscillopolarographic law;

--- Part 7. Determination of magnesium content - Flame atomic absorption spectrometry;

--- Part 8. Determination of silicon content - Molybdenum blue spectrophotometric method;

--- Part 9. Determination of antimony content atomic fluorescence spectrometry and flame atomic absorption spectrometry;

--- Part 10. Determination of tin content Phenylfluorone - cetyl trimethylamine spectrophotometry;

--- Part 11. lanthanum, cerium Determination Tribromoarsenazo spectrophotometry;

--- Part 12. lead, cadmium, iron, copper, tin, aluminum, arsenic, antimony, magnesium, lanthanum, cerium content - Inductively coupled plasma optical emission Spectroscopy;

--- Part 13. Optical Emission Spectrometry.

This is Part 1.

This section drafted in accordance with GB/T 1.1-2009 given rules.

This section uses three measurement methods for chemical analysis of zinc and zinc alloy aluminum content. Method 3 wherein modify using ISO 1169:2006 (E) "Determination of the amount of zinc aluminum alloy --- titration" (in English), on the main technical content of ISO 1169:2006 (E) the same as the preparation of structure Do not correspond exactly, this section lists the reg number and ISO 1169 in Appendix A.2006 (E) List of control clauses numbered in the appendix B are listed in this section with the ISO 1169:2006 (E) List of technical differences and their causes. About the technical differences have been incorporated into the text and identifies a single vertical line in which they are involved with the provisions margin.

This Part replaces GB/T 12689.1-2004 "zinc and zinc alloys - Determination of aluminum content", this part of the original criteria Ratio, the main changes are as follows.

- Of Tier 1 and Tier 2 text and text has been modified;
- Method 3. limit the scope of analysis is extended from 13% to 30%;
- Increased the indicative terms;
- Increasing the test report clause.

The non-ferrous metal part by the National Standardization Technical Committee (SAC/TC243) centralized.

This section is responsible for drafting unit. MCC Huludao Nonferrous Metals Group Co., Ltd., China Nonferrous Metals Industry Quality Standards and Metrology Institute the study.

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## 1.1 Scope

This method specifies the method for the determination of zinc and zinc alloy of aluminum content.

This method is applicable to the determination of zinc and zinc alloy of aluminum content. Measurement range. 0.0003% to 0.010%.

## 1.2 Principle of the method

Samples with hydrochloric acid - hydrogen peroxide dissolved in the acidic medium, aluminum and chrome azure S (CAS), polyethylene glycol octyl phenyl ether (OP), bromine Cetylpyridinium (CPB) micelles form a colored complex, the absorbance is measured in a

spectrophotometer at a wavelength of 620nm.

### 1.3 Reagents

Unless otherwise indicated in the analysis using only recognized as analytical grade reagents and distilled water or equivalent purity.

#### 1.3.1

hydrochloric acid ( $\rho=1.19\text{g/mL}$ ), pure class distinctions.

#### 1.3.2

Hydrogen peroxide (30%).

#### 1.3.3

hydrochloric acid (119).

#### 1.3.4

sodium acetate solution (300g/L).

#### 1.3.5

thiourea solution (100g/L).

#### 1.3.6

ascorbic acid (100g/L). the time is now equipped with.

#### 1.3.7

hydroxylamine hydrochloride solution (100g/L). the time is now equipped with.

#### 1.3.8

chromium azure S (CAS) solution (0.67g/L). Weigh 0.30g Chromium Azure S dissolved in 30mL of anhydrous ethanol, diluted with water to 450mL. The color of the solution molar extinction coefficient ( $[\epsilon]$ ) should be greater than  $5.0 \times 10^4 \text{L} \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$ .

#### 1.3.9

octyl polyethylene glycol phenyl ether (OP) solution (2998).

#### 1.3.10

cetylpyridinium bromide (CPB) solution (0.050g/L). Weigh 0.050g cetylpyridinium bromide dissolved in 50mL None Water, ethanol, and diluted with water to 1000mL.

#### 1.3.11

acetic acid - sodium acetate buffer solution. Weigh 300g of anhydrous sodium acetate were dissolved in 500mL of water, 36mL of glacial acetic acid was added to adjust the solution the solution pH was 6.0 to 6.4 (measured using a pH meter), diluted with water to 1000mL.

#### **1.3.12**

zinc substrate solution (0.020g/mL). Weigh 10.00g zinc metal ( $w_{\text{Zn}} \geq 99.999\%$  and  $w_{\text{Al}} \leq 0.0001\%$ ) in 300mL beaker, covered table dish, was added in 30mL hydrochloric acid (1.3.1), 1mL ~ 2mL hydrogen peroxide (1.3.2), to a low temperature heating Dissolve completely, take big bubble boiling 2min ~ 3min. Remove coolish, additional hydrochloric acid (3.1) to 50mL, transferred to 500mL volumetric flask, Dilute with water to volume, and mix.

#### **1.3.13**

aluminum standard stock solution. Weigh 0.1000g of aluminum ( $w_{\text{Al}} \geq 99.99\%$ ) in 300mL beaker, add 50mL hydrochloric acid