

ICS 77.120.20

CCS H 12



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

**GB/T 13748.20-2024**

Replacing GB/T 13748.20-2009

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**Methods for chemical analysis of magnesium and magnesium  
alloys - Part 20: Determination of element contents - Inductively  
coupled plasma atomic emission spectrometry**

镁及镁合金化学分析方法 第20部分：元素含量的测定 电感耦合等离子体原子发射光谱法

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**Issued on: April 25, 2024**

**Implemented on: November 1, 2024**

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**Issued by: State Administration for Market Regulation;  
Standardization Administration of China**

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### Foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting: This document is part 20 of GB/T 13748 "Chemical analysis methods for magnesium and magnesium alloys": GB/T 13748 has been published for the following part:

- Part 1: Determination of aluminum content;
- Part 2: Determination of tin content - Catechol violet spectrophotometric method;
- Part 3: Determination of lithium content by flame atomic absorption spectrometry;
- Part 4: Determination of manganese content-Periodate spectrophotometric method;
- Part 5: Determination of yttrium content - Inductively coupled plasma atomic emission spectrometry;
- Part 6: Determination of silver content by flame atomic absorption spectrometry;
- Part 7: Determination of zirconium content;
- Part 8: Determination of rare earth content by gravimetric method;
- Part 9: Determination of iron content by o-phenanthroline spectrophotometric method;
- Part 10: Determination of silicon content-Molybdenum blue spectrophotometric method;
- Part 11: Determination of beryllium content-Eriochrome cyanine blue R spectrophotometric method;
- Part 12: Determination of copper content;
- Part 13: Determination of lead content by flame atomic absorption spectrometry;

### 1 Scope

Part 20 of China's series on the chemical analysis of magnesium and magnesium alloys, covering the simultaneous determination of the alloying and impurity elements by inductively coupled plasma atomic emission spectrometry. It replaces a set of

single-element wet methods with one instrumental procedure that determines many elements from a single solution, which is what makes routine analysis of these alloys economic. The elements matter for two different reasons and the standard covers both. The alloying additions - aluminium, zinc, manganese, rare earths, zirconium, silicon - determine the mechanical properties and the castability, and are what the alloy designation means. The impurities determine whether the alloy corrodes: magnesium alloys are notoriously sensitive to iron, nickel and copper, which at levels of a few hundredths of a per cent form cathodic particles in the matrix and drive galvanic corrosion by orders of magnitude. That is the reason magnesium castings have historically had a bad reputation for corrosion that high-purity alloys largely dispelled, and the reason those three elements are the ones a purchaser checks first. The method is emission spectrometry on a dissolved sample: the solution is nebulised into a plasma and the light emitted by each element is measured at its characteristic wavelength. What the standard sets is the dissolution, which for magnesium is vigorous and needs controlling, the calibration against solutions matched to the alloy matrix, the choice of the analytical lines and the corrections for the spectral interferences between them, the internal standard, and the precision for each element over its stated range. Issued on 25 April 2024 and in force since 1 November 2024, it replaces GB/T 13748.20-2009.

This document describes the content of aluminum, iron, copper, manganese, nickel, lead, tin, titanium, zinc, zirconium, silver, arsenic, beryllium, calcium, cadmium, chromium, potassium, lithium, sodium, antimony, Methods for determination of strontium, lanthanum, cerium, praseodymium, neodymium, gadolinium, yttrium, erbium, dysprosium and ytterbium contents: This document applies to aluminum, iron, copper, manganese, nickel, lead, tin, titanium, zinc, zirconium, silver, arsenic, beryllium, calcium, cadmium, chromium, potassium, lithium, sodium, antimony, Determination of strontium, lanthanum, cerium, praseodymium, neodymium, gadolinium, yttrium, erbium, dysprosium and ytterbium content: The determination range is shown in Table 1: This document is not applicable to arbitration on chemical composition analysis of magnesium and magnesium alloys: Table

1 Measurement range element Quality score element Quality score Al 0:0010~12:

00 Cr 0:0005~0:050 Fe 0:0005~0:50 K 0:0050~0:050 Cu 0:0002~9:

00 Li 0:0005~16:

00 Mn 0:0005~3:

00 Na 0:0050~0:

50 Ni 0:0002~17:

00 Sb 0:0010~0:

00 Sn 0:0010~5:

00 La 0:010~5:

00 Ti 0:0005~0:050 Ce 0:010~5:

00 Zn 0:0005~10:

00 Pr 0:010~5:

00 Zr 0:0005~1:

## 2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document: For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document: