



Standard Test Methods for Chemical Analysis of Magnesium and Magnesium Alloys¹

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1. Scope

1.1 These test methods cover the chemical analysis of magnesium and magnesium alloys having chemical compositions within the following limits:

Aluminum, %	0.5 to 12
Copper, %	0.005 to 0.1
Iron, %	0.002 to 0.1
Lead, %	0.001 to 0.5
Manganese, %	0.01 to 2.0
Nickel, %	0.0005 to 0.5
Rare earth elements, %	0.2 to 10
Silicon, %	0.01 to 0.8
Thorium, %	0.2 to 25
Tin, %	0.5 to 10
Zinc, %	0.3 to 20
Zirconium, %	0.03 to 1.0
Magnesium, %	remainder

1.2 The analytical procedures appear in the following order:

	Section
Aluminum:	
Benzoate-Oxinate (Gravimetric) Method	8-15
Sodium Hydroxide (Potentiometric) Method (Optional Routine Method)	16-23
Copper:	
Neocuproine (Photometric) Method	24-33
Hydrobromic Acid-Phosphoric Acid (Photometric) Method	34-43
Iron by the 1,10-Phenanthroline (Photometric) Method	44-53
Lead by the Dithizone (Photometric) Method	54-63
Magnesium—Analysis for Manganese and Zinc by Direct Current Plasma Spectroscopy (Proposal)	2
Manganese by the Periodate (Photometric) Method	64-73
Nickel:	
Dimethylglyoxime Extraction (Photometric) Method	74-83
Dimethylglyoxime (Gravimetric) Method	84-91
Rare Earth Elements by the Sebacate-Oxalate (Gravimetric) Method	92-98
Silicon:	
Perchloric Acid (Gravimetric) Method	99-104
Molybdosilicic Acid (Photometric) Method	105-114
Thorium by the Benzoate-Oxalate (Gravimetric) Method	115-121
Tin by the Iodine (Volumetric) Method	122-129

Zinc:

Ethylenediamine Tetraacetate (Volumetric) Method	130-137
Potassium Ferrocyanide (Volumetric) Method	138-144
Zirconium by the Alizarin Red (Photometric) Method	145-154

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Specific precautions are given in Section 5.*

2. Referenced Documents

2.1 ASTM Standards:

- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance With Specifications³
- E 30 Test Methods for Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron, and Wrought Iron⁴
- E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals⁴
- E 55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition⁴
- E 60 Practice for Photometric and Spectrophotometric Methods for Chemical Analysis of Metals⁴
- E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition⁴

3. Significance and Use

3.1 These test methods for the chemical analysis of metals and alloys are primarily intended to test such materials for compliance with compositional specifications. It is assumed that all who use these test methods will be trained analysts capable of performing common laboratory procedures skillfully and safely. It is expected that work will be performed in a properly equipped laboratory.

4. Apparatus, Reagents, and Photometric Practice

4.1 Apparatus and reagents required for each determination are listed in separate sections preceding the procedure. The apparatus, standard solutions, and certain other reagents used

¹ These test methods are under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and are the direct responsibility of Subcommittee E01.04 on Aluminum and Magnesium.

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² Appears in the gray pages of the *Annual Book of ASTM Standards*, Vol 03.05.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ *Annual Book of ASTM Standards*, Vol 03.05.