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GB/T 7999-2015

Replacing GB/T 7999-2007

Optical Emission Spectrometric Analysis Method of Aluminum and Aluminum Alloys

铝及铝合金光电直读发射光谱分析方法

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard replaced GB/T 7999-2007 *Optical Emission Spectrometric Analysis Method of Aluminum and Aluminum Alloys*; compared with GB/T 7999-2007, this Standard has the major changes as follows:

- Add “Warning”;
- Increase 4 elements of barium, boron, lithium, scandium to “1 Scope”;
- Re-adjust the order of elements according to their English names in Table 1 and Table 2;
- Expand the analytical lower limit of 11 elements like bismuth, cadmium, calcium, chromium, gallium, lead, nickel, sodium, vanadium, zinc and zirconium;
- Add provisions of “standard sample, control sample” to “4 Auxiliary Equipment, Materials, Environment”;
- Add provisions of “apparatus safety guarantee” in “5 Apparatus”;
- Change the contents of “6 Specimen” into “specimen shall meet the requirements of GB/T 17432”;
- Re-draw “7 Analytical Procedures”;
- Change “Measurement range” in “Table 2” into “possible interference elements and their wavelengths”; add a recommended analytical spectral line for each 7 elements including calcium, cerium, lead, magnesium, manganese, nickel, vanadium, etc.; the spectral line of Ga element is revised to be “294.36” nm;
- Add the provisions of allowable deviation with mass fraction $\leq 0.0005\%$ and repeatability;
- Combine “9 Quality Assurance and Control” into “7 Analytical Procedures”;
- Add “9 Test Report”.

This Standard was proposed by China Non-Ferrous Metals Industry Association.

This Standard shall be under the jurisdiction of National Technical Committee for Standardization of Non-Ferrous Metal (SAC/TC 243).

Drafting organizations of this Standard: Northeast Light Alloy Co., Ltd., and Nonferrous Metals Technology and Economic Research Institute.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 8170 Rules of Rounding off for Numerical Values & Expression and Judgment of Limiting Values

GB/T 17432 Methods of Sampling for Analyzing the Chemical Composition of Wrought Aluminum and Aluminum Alloys

3 Method Summary

In the argon atmosphere, place the specimen processed as per requirements onto the excitation station, and act as an electrode; the energy generated by light source generator vaporize, atomize the analyte, as well as excite and emit the characteristic spectral line of the to-be-measured elements; after the light splitting by the dispersion system; measure the strength of selected internal marking line and the analytical line; according to the relative strength of analytical line, the data processing system shall directly read the results on the working curve; so that realize the quantitative analysis against the to-be-measured elements in the specimen.

4 Auxiliary Equipment, Material and Environment

4.1 Equipment for processing specimen

Lathe or miller.

4.2 Excite gap to protect gas

Argon (purity $\geq$ 99.995%); recommend to use argon purifier.

4.3 Environmental conditions of optical emission spectrometer

The optical emission spectrometer shall be placed in the lab where it is anti-electromagnetic interference, anti-shock, and gas-corrosion-free; the environmental temperature and humidity shall be controlled as per the requirements of optical emission spectrometer.

4.4 Standard sample

It is used for establishing the working curve; developed by the national-level agency or

recognized authority; contains the measuring range of analytical elements; meanwhile also has appropriate mass fraction gradient. 3 and above standard samples consist of a series.

4.5 Standardized sample

The standardized sample shall have very homogeneous and appropriate content; can be selected from the standard sample used for establishing working curve; also can be self-made; the self-made one shall ensure the sample is uniform, stable, and good reproducibility.

4.6 Control sample

The control sample shall have an accurate fixed value, its chemical composition, metallurgical processing, organizing state shall be basically consistent with the specimen. The control sample can be self-made, while the self-made one shall ensure the sample is uniform, stable, good reproducibility, and accurate fixed value.

5 Apparatus

5.1 Optical emission spectrometer.

5.2 Optical emission spectrometer shall be equipped with power restrictions using safety interlocks.

5.3 Optical emission spectrometer shall be equipped with filtering exhaust device, so that treat the potentially toxic soot discharged from the excitation room; and discharge the waste argon outdoors. Regularly clean and replace the filtering system according to the instructions of instrument.

6 Specimen

The specimen shall meet the requirements of GB/T 17432.

7 Analytical Procedures

7.1 Working state control of optical emission spectrometer

7.1.1 According to the requirements and provisions of optical emission spectrometer, check the instrument state, treat it if there is any abnormal situation.

7.1.2 Apply the certified standard substance to check the effectiveness of analytical method every weekly or biweekly; when the process is out of control, find out the cause,

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