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

XB/T 614.6-2011

**Chemical analysis methods of gadolinium-magnesium alloy-Part 6:
Determination of aluminum, calcium, copper, iron, nickel and silicon
contents-Inductively coupled plasma atomic emission spectrometry
(English Translation)**

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Foreword

XB/T 614 "Methods for Chemical Analysis of Gadolinium Magnesium Alloys" is divided into 6 parts.

---Part 1: Determination of the total amount of rare earths by gravimetric method;

---Part 2: Determination of magnesium content EDTA titration;

---Part 3: Determination of carbon content high frequency-infrared absorption method;

---Part 4: Determination of fluorine content by steam distillation spectrophotometry;

---Part 5: Determination of rare earth impurities;

--- Part 6: Determination of the amount of aluminum, calcium, copper, iron, nickel, and silicon inductively coupled plasma atomic emission spectrometry.

This part is part 6.

This part is under the jurisdiction of the National Rare Earth Standardization Technical Committee (SAC/TC229).

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1 Scope

This section specifies the determination method of aluminum, calcium, copper, iron, nickel and silicon content in gadolinium-magnesium alloy.

This section applies to the determination of aluminum, calcium, copper, iron, nickel and silicon content in gadolinium-magnesium alloys. The measurement range is shown in Table

1.

Table 1

Element measurement range/% Element measurement range/% Aluminum 0.010~0.20 Iron
0.0050~0.20 Calcium 0.0050~0.20 Nickel 0.0050~0.20 Copper 0.0050~0.20 Silicon
0.010~0.20

2 Method principle

After the sample was dissolved in nitric acid, it was measured by argon plasma spectroscopy, and the quasi-matrix matching method was used to correct the matrix effect.

3 Reagents and materials

3.1

Nitric acid (1 1).

3.2

Aluminum standard storage solution. accurately weigh 1.0000g of metallic aluminum [w(Al)≥99.99%] into a 300mL beaker and add 20mL Water and 20mL hydrochloric acid (1 1), heated to dissolve until clear, and steamed until there is salt precipitation. Remove, add 40mL nitric acid, heat to dissolve until clear.

Cool to room temperature, transfer the solution into a 1000mL volumetric flask, dilute to the mark with water, and mix. 1mL of this solution contains 1mg of aluminum.

3.3

Calcium standard storage solution. Weigh 2.4971g anhydrous calcium carbonate (dried at 110°C) into a 300mL beaker, add 20mL water 30mL nitric acid (3.1), heat to dissolve until clear, boil to remove carbon dioxide. Cool to room temperature, transfer the solution into a 1000mL volumetric flask, Add 30mL nitric acid, dilute to the mark with water, and mix. 1mL of this solution contains 1mg of calcium.

3.4

Copper standard storage solution. accurately weigh 1.0000g of metallic copper [w(Cu)≥99.99%] into a 300mL beaker and add 20mL 20mL of nitric acid (3.1) in water, heated to dissolve until clear, boil to remove nitrogen oxides. Cool to room temperature, transfer the solution into a 1000mL volumetric flask Add 40mL nitric acid, dilute to the mark with water, and mix. 1mL of this solution contains 1mg of copper.

3.5

Iron standard stock solution. accurately weigh 1.0000g metallic iron [w(Fe)≥99.99%] into a 300mL beaker, add 20mL 30mL of hydrochloric acid (1 1) in water, heated to dissolve until

clear, and steamed until the precipitation of salts. Remove, add 40mL nitric acid, heat to dissolve until clear. cold After reaching room temperature, transfer the solution to a 1000mL volumetric flask, dilute to the mark with water, and mix well. 1mL of this solution contains 1mg of iron.

3.6

Nickel standard storage solution. accurately weigh 1.0000g of metallic nickel [w(Ni) $\geq$ 99.99%] into a 300mL beaker, add 20mL Water 20mL nitric acid (3.1), heat to dissolve until clear, boil to remove nitrogen oxides. Cool to room temperature, transfer the solution into a 1000mL volumetric flask Add 40mL nitric acid, dilute to the mark with water, and mix. 1mL of this solution contains 1mg of nickel.

3.7

Silicon standard storage solution. Weigh 0.2139g of silicon dioxide [w(SiO₂) $\geq$ 99.99%] (previously dried at 120°C for 2h), and place it in platinum