

ICS 77.120.99

CCS H 14

XB

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

XB/T 617.3-2014

Chemical analysis methods for neodymium iron boron alloy - Part 3: Determination of boron, aluminum, copper, cobalt, magnesium, silicon, calcium, vanadium, chromium, manganese, nickel, zinc and gallium contents - Inductively coupled plasma atomic emission spectrometry

钕铁硼合金化学分析方法 第3部分：硼、铝、铜、钴、镁、硅、钙、钒、铬、锰、镍、锌和镓量的测定 电感耦合等离子体原子发射光谱法

(English Translation)

Issued on: October 14, 2014

Implemented on: April 1, 2015

**Issued by: Ministry of Industry and Information Technology of the
People's Republic of China**

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Foreword

This document was issued on 14 October 2014 by the Ministry of Industry and Information Technology of the People's Republic of China, and has applied since 1 April 2015.

It is an XB/T standard: a recommended industry standard of China's rare earth industry.

XB/T 617, Chemical analysis methods for neodymium iron boron alloy, consists of seven parts: Part 1, determination of total rare earth content; Part 2, determination of fifteen rare earth elements; Part 3, determination of boron, aluminium, copper, cobalt, magnesium, silicon, calcium, vanadium, chromium, manganese, nickel, zinc and gallium contents by inductively coupled plasma atomic emission spectrometry; Part 4, determination of iron content by potassium dichromate titration; Part 5, determination of zirconium, niobium, molybdenum, tungsten and titanium contents by inductively coupled plasma atomic emission spectrometry; Part 6, determination of carbon content by high-frequency combustion infrared absorption; Part 7, determination of oxygen and nitrogen contents by pulse heating infrared absorption and thermal conductivity.

This part is Part 3 of XB/T 617.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part is under the jurisdiction of the National Technical Committee on Rare Earth of Standardization Administration of China (SAC/TC 229).

1 Scope

This part of XB/T 617 specifies the method for the determination of boron, aluminium, copper, cobalt, magnesium, silicon, calcium, vanadium, chromium, manganese, nickel, zinc and gallium contents in neodymium iron boron alloy.

This part is applicable to the determination of these elements in neodymium iron boron alloy over the following ranges: boron 0.80 % to 1.30 %; aluminium, copper, silicon, vanadium, chromium and gallium 0.010 % to 0.50 %; magnesium, calcium, manganese, nickel and zinc 0.0050 % to 0.50 %; cobalt 0.0050 % to 5.00 %.

2 Principle

The sample is decomposed with acid and the elements are measured with an inductively coupled plasma atomic emission spectrometer, the matrix effect being corrected by matrix matching.

3 Reagents and materials

3.1

Mixed hydrochloric and nitric acid (3+1+4).

3.2

Boron standard stock solution

Dissolve 5.7174 g of boric acid [$w(\text{H}_3\text{BO}_3) \geq 99.99\%$] in a little water, warming gently until completely dissolved, transfer to a 1,000 mL volumetric flask, dilute to the mark with water and mix. 1 mL of this solution contains 1 mg of boron.

3.3

Aluminium standard stock solution

Weigh 1.0000 g of aluminium metal [$w(\text{Al}) \geq 99.99\%$] into a 300 mL beaker, add 20 mL of water and 3 g of sodium hydroxide; when dissolved, neutralize slowly with hydrochloric acid (1+1) until a precipitate appears and add 20 mL in excess, heat while stirring until dissolved, cool, transfer to a 1,000 mL volumetric flask, dilute to the mark with water and mix. 1 mL of this solution contains 1 mg of aluminium.

3.4

Copper standard stock solution

Weigh 1.0000 g of copper metal [$w(\text{Cu}) \geq 99.99\%$], add 20 mL of nitric acid (1+1), dissolve with gentle heat and evaporate nearly to dryness; add 10 mL of sulfuric acid (1+1) and evaporate until white fumes appear; cool, dissolve the salts in water, transfer to a 1,000 mL volumetric flask, dilute to the mark with water and mix. 1 mL of this solution contains 1 mg of copper.

3.5

Cobalt standard stock solution

Weigh 1.0000 g of cobalt metal [$w(\text{Co}) \geq 99.99\%$] into a beaker, add 50 mL of nitric acid (1+1) and dissolve on a water bath; add a little water and boil, cool to room temperature, transfer to a 1,000 mL volumetric flask, dilute to the mark with water and mix. 1 mL of this solution contains 1 mg of cobalt.