

ICS 77.120.99

CCS H63



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

GB/T 13747.20-2017

Replacing GB/T 13747.20-1992

**Methods for chemical analysis of zirconium and zirconium
alloys - Part 20: Determination of hafnium content - Inductively
coupled plasma atomic emission spectrometry**

锆及锆合金化学分析方法 第20部分：铪量的测定 电感耦合等离子体原子发射光谱法

Issued on: September 29, 2017

Implemented on: April 1, 2018

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of the People's Republic of China;
Standardization Administration of China**

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Foreword

GB/T 13747 "zirconium and zirconium alloy chemical analysis method" is divided into 27 parts.

- Part 1. Determination of tin content potassium iodate titration and phenylfluorone - polyethylene glycol octyl phenyl ether spectrophotometry;
- Part 2. Determination of iron content 1,10-phenanthroline spectrophotometry and inductively coupled plasma atomic emission spectrometry;
- Part 3. Determination of nickel content dimethylglyoxime spectrophotometry and inductively coupled plasma atomic emission spectrometry;
- Part 4. Determination of chromium content Diphenylcarbazide spectrophotometry and inductively coupled plasma atomic emission spectrometry;
- Part 5. Determination of aluminum content chrome azure S-tetradecyl pyridine chloride spectrophotometry;
- Part 6. Determination of copper content 2,9-dimethyl-1,10-phenanthroline spectrophotometry;
- Part 7. Determination of manganese content potassium periodate spectrophotometry and inductively coupled plasma atomic emission spectrometry;
- Part 8. Determination of cobalt content Nitroso R salt spectrophotometry;
- Part 9. Determination of magnesium content by flame atomic absorption spectrometry;
- Part 10. Determination of tungsten content thiocyanate spectrophotometry;
- Part 11. Determination of molybdenum content thiocyanate spectrophotometry;
- Part 12. Determination of silicon content Molybdenum blue spectrophotometry;
- Part 13. Determination of lead content polarographic method;

1 Scope

GB/T 13747.20-2017 is the Chinese national standard on methods for chemical analysis of zirconium and zirconium alloys - part 20: determination of hafnium content - inductively coupled plasma atomic emission spectrometry, in the field of metallurgy. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 29 September 2017 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 April 2018. Classification: ICS 77.120.99, CCS H63. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

GB/T 13747 provisions of this part of zirconium and zirconium alloys Determination of hafnium content. This section applies to sponge zirconium, zirconium and zirconium alloy determination of hafnium content. Measurement range. 0.0050% ~ 5.00%.

2 Method summary

Hydrochloric acid and hydrofluoric acid dissolved sample, dropping nitric acid oxidation. Inductively Coupled Plasma Atomic Emission Spectrometry was used for the determination, according to the work Calculated by the curve of hafnium mass concentration, expressed in mass fraction measurement results.

3 Reagent

Unless otherwise stated, only reagents identified as analytical grade and laboratory grade II water were used in the analysis.

3.1 Nitric acid ($\rho =$

3.2 Hydrochloric acid (1 1). Hydrofluoric acid (1 1).

3.4 Metal zirconium (wZr 99.95%, wHf < 0.0005%).

3.5 Hafnium standard stock solution Weigh 1.0000g of pure hafnium (wHf $\geq$ 99.95%) in a Teflon beaker, slowly dropwise add 4mL of hydrofluoric Acid (3.3) to dissolve, add 10mL hydrochloric acid (3.2), shake. Remove, cool to room temperature, transferred to 1000mL volumetric flask, diluted with water To the mark, mix well. Immediately transferred to a plastic bottle to save. This solution 1 mL contains

1.0 mg of hafnium.

3.6 hafnium standard solution Pipette 50.00mL hafnium standard stock solution (3.5) in 500mL volumetric flask, add 2mL hydrofluoric acid (3.3), 5mL hydrochloric acid (3.2) diluted with water to the mark, mix well. Immediately transferred to a plastic bottle to save. 1 mL of this solution contains 100 µg of hafnium.

3.7 Argon. Volume fraction $\geq 99.99\%$.

Inductively Coupled Plasma Atomic Emission Spectrometer with hydrofluoric acid atomizer system.

5.1 Sampling Sponge zirconium, zirconium and zirconium alloy sampling should have been promulgated by the corresponding standard methods.

5.2 Sample Processing Cut the specimen to a length of not more than 5 mm of debris.