

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

EJ/T 20171-2018

**Determination of oxygen in metal uranium and uranium alloy by
pulse heating inert gas fusion-infrared absorption method**

金属铀及铀合金中氧含量的测定 脉冲加热情气熔融-红外吸收法

(English Translation)

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1 Scope

This standard specifies the method principle, reagents or materials, instruments and equipment, analytical procedure, result calculation, precision and permissible deviation for the determination of oxygen in uranium and uranium alloy by pulse heating inert gas fusion-infrared absorption method.

This standard applies to the determination of oxygen in metal uranium, uranium-niobium alloy and uranium-titanium alloy. Determination range: 0.0020 % to 0.30 % (mass fraction).

2 Principle of the method

The sample is placed in a graphite crucible and heated to melting on an electrode furnace, whereby oxygen compounds are reduced and decomposed. The oxygen released combines with carbon in the graphite crucible to form a gas mixture of carbon monoxide and carbon dioxide. The gas mixture is carried by an inert carrier gas into a high-temperature catalytic furnace, where carbon monoxide is converted into carbon dioxide. The carbon dioxide is then carried by the carrier gas into an infrared cell for detection, and the oxygen content in the sample is calculated from the intensity of light absorption.

3 Reagents or materials

Unless otherwise specified, only reagents of analytical grade can be used in the analysis.

3.1

Water, conductivity ≤ 0.10 mS/m.

3.2

Nitric acid, $\rho(\text{HNO}_3) = 1.42$ g/mL.

3.3

Nitric acid solution, 1 + 1.

3.4

Acetone, $\rho(\text{C}_3\text{H}_6\text{O}) = 0.788$ g/mL.

3.5

Carrier gas, He ≥ 99.995 %.

3.6

Nickel basket, for gas analysis use, $\phi 6$ mm x 10 mm.

3.7

Graphite crucible, for gas analysis use (standard type).

3.8

Reference material for oxygen in steel; select a suitable reference material with an oxygen mass fraction between 0.0020 % and 0.30 %.

4.1 Pulse heating infrared absorption oxygen analyser

The instrument shall meet the following requirements:

- a) The pulse heating furnace shall be installed in a fume hood with good ventilation;
- b) The pulse heating power shall not be less than 6.5 kW;
- c) Detector sensitivity: 0.1 $\mu\text{g/g}$.