



Standard Test Methods for Analysis of Sintered Gadolinium Oxide-Uranium Dioxide Pellets¹

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1. Scope

1.1 These test methods cover procedures for the analysis of sintered gadolinium oxide-uranium dioxide pellets to determine compliance with specifications.

1.2 The analytical procedures appear in the following order:

	Section
Carbon (Total) by Direct Combustion—Thermal Conductivity Method	2
C1408 Test Method for Carbon (Total) in Uranium Oxide Powders and Pellets By Direct Combustion-Infrared Detection Method	3
Chlorine and Fluorine by Pyrohydrolysis Ion-Selective Electrode Method	4
C1502 Test Method for Determination of Total Chlorine and Fluorine in Uranium Dioxide and Gadolinium Oxide	3
Gadolinia Content by Energy-Dispersive X-Ray Spectrometry	4
C1456 Test Method for Determination of Uranium or Gadolinium, or Both, in Gadolinium Oxide-Uranium Oxide Pellets or by X-Ray Fluorescence (XRF)	3
Hydrogen by Inert Gas Fusion	4
C1457 Test Method for Determination of Total Hydrogen Content of Uranium Oxide Powders and Pellets by Carrier Gas Extraction	3
Isotopic Uranium Composition by Multiple-Filament Surface-Ionization Mass Spectrometric Method	2
C1413 Test Method for Isotopic Analysis of Hydrolyzed Uranium Hexafluoride And Uranyl Nitrate Solutions By Thermal Ionization Mass Spectrometry	3
C1347 Practice for Preparation and Dissolution of Uranium Materials for Analysis	3
Nitrogen by Distillation—Nessler Reagent (Photometric) Method	6 to 16
Oxygen-to-Metal Ratio of Sintered Gadolinium Oxide-Uranium Dioxide Pellets	4
C1430 Test Method for Determination of Uranium, Oxygen to Uranium, and Oxygen to Metal (O/M) in Sintered Uranium Dioxide and Gadolinia-Uranium Dioxide Pellets by Atmospheric Equilibration	3
Spectrochemical Determination of Trace Impurity Elements	4
C1517 Test Method for Determination of Metallic Impurities in Uranium Metal or Compounds by DC-Arc Emission Spectroscopy	3
Total Gas by Hot Vacuum Extraction	2

Ceramographic Determination of Free Gd_2O_3 and Free UO_2 to Estimate the Homogeneity of (U,Gd) O_2 Pellets	Section 17 to 24
Ceramographic Determination of Average Grain Size by Linear Intercept after Chemical Etching	25 to 32

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:³

- C922** Specification for Sintered Gadolinium Oxide-Uranium Dioxide Pellets
- C1347** Practice for Preparation and Dissolution of Uranium Materials for Analysis
- C1408** Test Method for Carbon (Total) in Uranium Oxide Powders and Pellets By Direct Combustion-Infrared Detection Method
- C1413** Test Method for Isotopic Analysis of Hydrolyzed Uranium Hexafluoride and Uranyl Nitrate Solutions by Thermal Ionization Mass Spectrometry
- C1430** Test Method for Determination of Uranium, Oxygen to Uranium (O/U), and Oxygen to Metal (O/M) in Sintered Uranium Dioxide and Gadolinia-Uranium Dioxide Pellets by Atmospheric Equilibration
- C1456** Test Method for Determination of Uranium or Gadolinium (or both) in Gadolinium Oxide-Uranium Oxide Pellets or by X-Ray Fluorescence (XRF)
- C1457** Test Method for Determination of Total Hydrogen Content of Uranium Oxide Powders and Pellets by Carrier Gas Extraction
- C1502** Test Method for Determination of Total Chlorine and Fluorine in Uranium Dioxide and Gadolinium Oxide
- C1517** Test Method for Determination of Metallic Impurities in Uranium Metal or Compounds by DC-Arc Emission Spectroscopy
- D1193** Specification for Reagent Water
- E112** Test Methods for Determining Average Grain Size

¹ These test methods are under the jurisdiction of ASTM C26 on Nuclear Fuel Cycle and are the direct responsibility of C26.05 on Methods of Test.

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² Discontinued 1999. See C968 – 94.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

⁴ Discontinued 2005. See C968 – 99.