



Standard Test Methods for Chemical and Atomic Absorption Analysis of Uranium-Ore Concentrate¹

This standard is issued under the fixed designation C 1022; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These test methods cover procedures for the chemical and atomic absorption analysis of uranium-ore concentrates to determine compliance with the requirements prescribed in Specification C 967.

1.2 The analytical procedures appear in the following order:

	Sections
Uranium by Ferrous Sulfate Reduction—Potassium Dichromate Titrimetry	9
Nitric Acid-Insoluble Uranium	10 to 18
Extractable Organic Material	19 to 26
Arsenic by Diethyldithiocarbamate (Photometric Method)	27 to 36
Carbonate by CO ₂ Gravimetry	37 to 43
Fluoride by Ion-Selective Electrode	44 to 51
Halides by Volhard Titration	52 to 59
Moisture by Loss of Weight at 110°C	60 to 66
Phosphorus by Spectrophotometry	67 to 75
Silicon by Gravimetry	76 to 82
Thorium by the Thorin (Photometric) Method	83 to 91
Calcium, Iron, Magnesium, Molybdenum, Titanium, and Vanadium by Atomic Absorption Spectrophotometry	92 to 101
Potassium and Sodium by Atomic Absorption Spectrophotometry	102 to 111
Boron by Spectrophotometry	112 to 121

1.3 *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.* Specific precautionary statements are given in Sections 7, 32, and Note 14.

2. Referenced Documents

2.1 ASTM Standards:

- C 761 Test Methods for Chemical, Mass Spectrometric, Spectrochemical, Nuclear, and Radiochemical Analysis of Uranium Hexafluoride²
- C 859 Terminology Relating to Nuclear Materials²
- C 967 Specification for Uranium Ore Concentrate²
- C 1254 Test Method for Uranium in Mineral Acids by X-Ray Fluorescence

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

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² *Annual Book of ASTM Standards*, Vol 12.01.

C 1267 Test Method for Uranium by Iron (II) Reduction in Phosphoric Acid Followed by Chromium (IV) Titration in the Presence of Vanadium²

C 1347 Practice for Preparation and Dissolution of Uranium Materials for Analysis²

D 1193 Specification for Reagent Water³

E 60 Practice for Photometric and Spectrophotometric Methods for Chemical Analysis of Metals⁴

3. Terminology

3.1 *Definitions*—For definitions of terms used in these test methods, refer to Terminology C 859.

4. Significance and Use

4.1 The test methods in this standard are designed to show whether a given material meets the specifications prescribed in Specification C 967.

4.2 Because of the variability of matrices of uranium-ore concentrate and the lack of suitable reference or calibration materials, the precision and bias of these test methods should be established by each individual laboratory that will use them. The precision and bias statements given for each test method are those reported by various laboratories and can be used as a guideline.

4.3 Instrumental test methods such as X-ray fluorescence and emission spectroscopy can be used for the determination of some impurities where such equipment is available.

5. Interferences

5.1 Interferences are identified in the individual test methods.

5.2 Ore concentrates are of a very variable nature; therefore, all interferences are very difficult to predict. The individual user should verify the applicability of each procedure for specific ore concentrates.

6. Reagents

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society,

³ *Annual Book of ASTM Standards*, Vol 11.01.

⁴ *Annual Book of ASTM Standards*, Vol 03.05.