



Standard Test Method for Determination of Boron, Silicon, and Technetium in Hydrolyzed Uranium Hexafluoride by Inductively Coupled Plasma—Mass Spectrometer After Removal of Uranium by Solid Phase Extraction¹

This standard is issued under the fixed designation C1771; 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 This test method covers the determination of boron, silicon and technetium in hydrolyzed uranium hexafluoride (UF_6) by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) after separation of the uranium by solid phase extraction.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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. Some specific hazards statements are given in Section 7 on Hazards.*

2. Referenced Documents

2.1 *ASTM Standards:*²

C787 Specification for Uranium Hexafluoride for Enrichment

C859 Terminology Relating to Nuclear Materials

C996 Specification for Uranium Hexafluoride Enriched to Less Than 5 % ²³⁵U

C1346 Practice for Dissolution of UF_6 from P-10 Tubes

C1689 Practice for Subsampling of Uranium Hexafluoride

D1193 Specification for Reagent Water

3. Terminology

3.1 *Definitions*—For definitions of other standard terms in this test method, refer to Terminology **C859**.

¹ This test method is under the jurisdiction of ASTM Committee **C26** on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee **C26.05** on Methods of Test.

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² 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.

3.2 Definitions:

3.2.1 *internal reference solution, n*—a solution containing non-analyte elements, the signal from which is used to correct for variation in the performance of a measuring instrument through the course of analyzing a batch of samples, thereby improving precision.

3.2.2 *method blank, n*—a solution which in so far as is practical duplicates the sample to be analyzed and passes through the same measurement process but does not initially contain significant quantities of any of the analytes to be measured.

3.2.2.1 *Discussion*—The method blank does not initially contain significant quantities of analyte, hence the value of any analyte measured may be assumed to be due to interference, matrix effects or contamination introduced as a consequence of sample processing. The contribution of such factors to the value measured on the genuine sample may therefore be eliminated by subtracting the measured value for the method blank, typically providing a better estimate for the true value of the quantity of analyte in the sample.

3.2.3 *recovery correction, n*—a factor applied to the measured value of the analyte in the sample to account for losses of analyte during sample processing.

3.2.3.1 *Discussion*—Some of the analyte originally present in a sample is likely to be lost during the process of preparing the sample for instrumental measurement, so that the measured value will typically be subject to negative bias. The proportion of analyte lost may be estimated by repeated measurement of a sample containing a known quantity of the analyte and a correction factor introduced to account for losses. Recovery correction is only required when analyte losses are significant when compared with overall measurement uncertainty.

3.2.4 *spike, n*—a known quantity of analyte added to a sample.

4. Summary of Test Method

4.1 A 4 % by weight solution of UF_6 is initially prepared by reacting a quantity of UF_6 with water. Sub-sampling of UF_6 may be carried out as described in Practice **C1689**. Preparation