



Designation: D5174 – 23

Standard Test Method for Trace Uranium in Water by Pulsed-Laser Phosphorimetry¹

This standard is issued under the fixed designation D5174; 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 total uranium, by mass concentration, in water within the calibrated range of the instrument, 0.1 µg/L or greater. Samples with uranium mass concentrations above the laser phosphorimeter dynamic range are diluted to bring the concentration to a measurable level.

1.2 This test method was used successfully with reagent water. It is the user's responsibility to ensure the validity of this test method for waters of untested matrices.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D1129 Terminology Relating to Water

D1193 Specification for Reagent Water

D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water

D3370 Practices for Sampling Water from Flowing Process Streams

D4448 Guide for Sampling Ground-Water Monitoring Wells

D5847 Practice for Writing Quality Control Specifications for Standard Test Methods for Water Analysis

D6001 Guide for Direct-Push Groundwater Sampling for Environmental Site Characterization

E131 Terminology Relating to Molecular Spectroscopy

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminologies D1129 and E131.

3.1.2 For terms not defined in this test method or in Terminology D1129 or E131, reference may be made to other published glossaries.³

4. Summary of Test Method

4.1 This test method is based on the utilization of a laser phosphorimeter to determine total uranium, by mass, in water samples.

4.2 A sample aliquant is pipetted into a pretreated glass vial. Concentrated HNO₃ and hydrogen peroxide are added and the sample heated to dryness. This step is repeated as necessary and the residue is dissolved in dilute HNO₃. A complexant is added to an aliquant of this sample and analyzed in the phosphorimeter.

4.3 For screening purposes only, an aliquant of the sample may be pipetted directly into the phosphorimeter cell containing uranium complexant and read. This cannot be done if the sample was preserved with HCl or if the matrix is not known.

5. Significance and Use

5.1 This test method is useful for the analysis of total uranium in water following wet-ashing, as required, due to impurities or suspended materials in the water.

6. Interferences

6.1 *Absorption (Inner Filter Effect)*—This effect is more severe with ultraviolet excitation light (337 nm) than with visible excitation because many prevalent compounds have pi-bonding and absorb strongly in this region. Ferric iron and

¹ This test method is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.04 on Methods of Radiochemical Analysis.

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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 See *American National Standard Glossary of Terms in Nuclear Science and Technology* (ANSI N1.1), available from American National Standards Institute, 1430 Broadway, New York, NY 10014, www.ansi.org.