



Designation: D7168 – 21

Standard Test Method for ⁹⁹Tc in Water by Solid Phase Extraction Disk¹

This standard is issued under the fixed designation D7168; 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 describes a solid phase extraction (SPE) procedure to separate ⁹⁹Tc from environmental water (non-process-related or effluent water samples). Technetium-99 beta activity is measured by liquid scintillation spectrometry.

1.2 This test method is designed to measure ⁹⁹Tc in the range of approximately 0.037 Bq/L (1.0 pCi/L) or greater for a one litre sample.

1.3 This test method has been used successfully with tap water. It is the user's responsibility to ensure the validity of this test method for samples larger than 1 L and for waters of untested matrices.

1.4 Technetium-99 alternatively can be determined in water samples using Practice [D8026](#).

1.5 The values stated in SI units are to be regarded as standard. The values given in parentheses are provided for information only and are not considered standard.

1.6 *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.* For specific hazard statements, see Section 9.

1.7 *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

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.

[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

[D7282](#) Practice for Setup, Calibration, and Quality Control of Instruments Used for Radioactivity Measurements

[D7902](#) Terminology for Radiochemical Analyses

[D8026](#) Practice for Determination of Tc-99 in Water by Inductively Coupled Plasma Mass Spectrometry (ICP-MS)

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this standard, refer to Terminologies [D7902](#) and [D1129](#). For terms not defined in this test method or in Terminologies [D1129](#) or [D7902](#), refer to other published glossaries.³

4. Summary of Test Method

4.1 A measured aliquant of sample is transferred to a beaker. Hydrogen peroxide is added to facilitate the formation of the extractable pertechnetate ion. The sample may be heated to oxidize organics if such are suspected to be present. The entire sample is passed through a technetium-selective SPE disk onto which the pertechnetate is adsorbed. The disk is transferred to a liquid scintillation vial, cocktail added, and the contents well mixed. The beta emission rate of the sample is determined by liquid scintillation spectrometry. Chemical yield corrections are determined by the method of standard additions.

4.2 Minor differences in processing between Extraction Chromatographic Resin Discs and PTFE Membrane Discs are addressed in Variations A and B of the test method.

³ American National Standard Glossary of Terms, "Nuclear Science and Technology (ANSI N1.1), American National Standards Institute, 1430 Broadway, New York, NY 10018.