



Standard Test Method for Radon in Drinking Water¹

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1. Scope

1.1 This test method covers the measurement of radon in drinking water in concentrations above 2 Bq/L.

1.2 This test method may be used for absolute measurements by calibrating with a ^{226}Ra standard or for relative measurements by comparing the measurements made with each other.

1.3 This test method is used successfully with drinking water samples and Type III reagent water conforming to Specification D1193. It is the user's responsibility to ensure the validity of this test method for waters of untested matrices.

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

1.5 *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: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 Closed Conduits

D7902 Terminology for Radiochemical Analyses

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

2.2 Other Documents:

Multi-Agency Radiological Laboratory Analytical Protocols
Manual EPA402-B-04-001A, NUREG1576, NTIS

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.

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3. Terminology

3.1 Definitions:

3.2 For definitions of terms used in this standard, refer first to Terminology D7902 and second to Terminology D1129. For terms not defined in this standard, or in Terminologies D7902 or D1129, reference may be made to other published glossaries.

4. Summary of Test Method

4.1 This test method is based on the scintillation counting of ^{222}Rn and its progeny.

4.2 In a glass liquid scintillation vial, an aliquot of unaerated water is drawn into a syringe then gently injected beneath 10 mL of a suitable liquid scintillation cocktail that does not contain an emulsifier. The vials are capped, shaken, and allowed to stand 3 hours prior to counting to permit dark adaptation and buildup of short-lived radon progeny. Radon-222 contained in the sample is selectively partitioned into the scintillation cocktail. The sample is counted using a liquid scintillation counting system optimized for detection of ^{222}Rn activity.

5. Significance and Use

5.1 The most prevalent of the radon isotopes in ground water is ^{222}Rn . This isotope presents the greatest health risk compared to the other naturally occurring radon isotopes if ingested via the water pathway.

6. Interferences

6.1 Other radionuclides soluble in the scintillation cocktail may interfere. High energy beta/gamma emitters, even though they are not soluble in the scintillation mix, may also interfere. These interferences will cause a high bias if present in a significant quantity. These interferences would be rare in drinking water samples but may be observed in some cases.

6.2 A reduced or increased counting efficiency may result if sample quenching is significantly different than that of the calibration standard.

6.3 Scintillation stock cocktails and sample cocktail mixes must be dark-adapted to prevent artificial excitation of fluors