



Standard Test Method for Lead-210 in Water¹

This standard is issued under the fixed designation D7535; 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 radioactive ^{210}Pb in environmental water samples (for example, drinking, non-process and effluent waters) in the range of 37 mBq/L (1.0 pCi/L) or greater.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses are provided for information purposes only.

1.3 This 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 500 mL and for waters of untested matrices.

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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazards statements, see Section 9.

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

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 Set-up, Calibration, and Quality Control of Instruments Used for Radioactivity Measurements

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.

Current edition approved Jan. 1, 2015. Published January 2015. Originally approved in 2009. Last previous edition approved in 2009 as D7535 – 09^{e1}. DOI: 10.1520/D7535-09E01.

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.

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D1129.

4. Summary of Test Method

4.1 This test method is based on the utilization of solid phase extraction of lead from water samples with detection of the radioactive lead by beta gas flow proportional counting. An aliquot of the sample is measured into a beaker; iron carrier and lead carrier are added. Lead is scavenged by an iron hydroxide precipitation. Lead is then selectively sorbed on a solid phase extraction column and eluted with water. Lead is precipitated as lead sulfate and is collected on a filter paper. The lead sulfate precipitate is covered with aluminum foil and held for 5 days or longer for ^{210}Bi ingrowth. It is then counted for beta radiation on a gas flow proportional counter.

5. Significance and Use

5.1 This test method was developed to measure the concentration of ^{210}Pb in nonprocess water samples. This test method may be used to determine the concentration of ^{210}Pb in environmental samples.

6. Interferences

6.1 Significant amounts of stable lead (>0.3 mg/L) present in the sample will interfere with the chemical yield determination, leading to positive bias in the yield. If it is known or suspected that natural lead is present in the sample, blank sample aliquots to which no lead carrier content is added should be analyzed. The amount of natural lead contained in the sample shall be used to correct the yield.

6.2 In most cases measurable amounts of ^{210}Pb will be present in the Pb carrier used in 12.1. This additional contribution to the measured sample activity must be determined and treated as additional background activity. For each new carrier solution, the inherent ^{210}Pb in the carrier must be measured. A brief description of this additional background calibration is given in 11.2. Accurate determination of the combined standard uncertainty and the minimum detectable concentration should include this additional activity in the method background count rate.