



Standard Test Method for Static Leaching of Monolithic Waste Forms for Disposal of Radioactive Waste¹

This standard is issued under the fixed designation C1220; 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 provides a measure of the chemical durability of a simulated or radioactive monolithic waste form, such as a glass, ceramic, cement (grout), or cermet, in a test solution at temperatures $<100^{\circ}\text{C}$ under low specimen surface-area-to-leachant volume (S/V) ratio conditions.

1.2 This test method can be used to characterize the dissolution or leaching behaviors of various simulated or radioactive waste forms in various leachants under the specific conditions of the test based on analysis of the test solution. Data from this test are used to calculate normalized elemental mass loss values from specimens exposed to aqueous solutions at temperatures $<100^{\circ}\text{C}$.

1.3 The test is conducted under static conditions in a constant solution volume and at a constant temperature. The reactivity of the test specimen is determined from the amounts of components released and accumulated in the solution over the test duration. A wide range of test conditions can be used to study material behavior, including various leachant composition, specimen surface area-to-leachant volume ratios, temperatures, and test durations.

1.4 Three leachant compositions and four reference test matrices of test conditions are recommended to characterize materials behavior and facilitate interlaboratory comparisons of tests results.

1.5 Specimen surfaces may become altered during this test. Although not part of the test method, it is recommended that these altered surface regions be examined to characterize chemical and physical changes due to the reaction of waste forms during static exposure to solutions.

1.6 This test method is not recommended for evaluating metallic materials, the degradation of which includes oxidation reactions that are not controlled by this test method.

1.7 This test method must be performed in accordance with all applicable quality assurance requirements for acceptance of the data.

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

1.9 *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 a specific hazard statement, see 7.3.2.

2. Referenced Documents

2.1 ASTM Standards:²

C1109 Practice for Analysis of Aqueous Leachates from Nuclear Waste Materials Using Inductively Coupled Plasma-Atomic Emission Spectroscopy

C1174 Practice for Prediction of the Long-Term Behavior of Materials, Including Waste Forms, Used in Engineered Barrier Systems (EBS) for Geological Disposal of High-Level Radioactive Waste

D1193 Specification for Reagent Water

D1293 Test Methods for pH of Water

2.2 EPA Document:³

SW-846A Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

3. Terminology

3.1 Definitions:

3.1.1 *accumulated dose, n*—the sum of the absorbed doses received by the system considered regardless of whether it is exposed to radiation in a continuous or discontinuous fashion.

3.1.2 *accuracy, n*—the closeness of agreement between an individual result and an accepted reference value.

¹ This test method is under the jurisdiction of ASTM Committee C26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.07 on Waste Materials.

Current edition approved June 1, 2010. Published July 2010. Originally approved in 1992. Last previous edition approved in 2004 as C1220 – 98 (2004). DOI: 10.1520/C1220-10.

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 SW846A, 3rd Ed., Revision 1, U.S. Environmental Protection Agency, Washington, DC, December 1987.