



Standard Practice for Measurement of the Glass Dissolution Rate Using the Single-Pass Flow-Through Test Method¹

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1. Scope

1.1 This practice describes a single-pass flow-through (SPFT) test method that can be used to measure the dissolution rate of a homogeneous silicate glass, including nuclear waste glasses, in various test solutions at temperatures less than 100°C. Tests may be conducted under conditions in which the effects from dissolved species on the dissolution rate are minimized to measure the forward dissolution rate at specific values of temperature and pH, or to measure the dependence of the dissolution rate on the concentrations of various solute species.

1.2 Tests are conducted by pumping solutions in either a continuous or pulsed flow mode through a reaction cell that contains the test specimen. Tests must be conducted at several solution flow rates to evaluate the effect of the flow rate on the glass dissolution rate.

1.3 This practice excludes static test methods in which flow is simulated by manually removing solution from the reaction cell and replacing it with fresh solution.

1.4 Tests may be conducted with demineralized water, chemical solutions (such as pH buffer solutions, simulated groundwater solutions, and brines), or actual groundwater.

1.5 Tests may be conducted with crushed glass of a known size fraction or monolithic specimens having known geometric surface area. The reacted solids may be examined to provide additional information regarding the behavior of the material in the test and the reaction mechanism.

1.6 Tests may be conducted with glasses containing radionuclides. However, this test method does not address safety issues for radioactive samples.

1.7 Data from these tests can be used to determine the values of kinetic model parameters needed to calculate the glass corrosion behavior in a disposal system over long periods (for example, see Practice C1174).

1.8 This practice must be performed in accordance with all quality assurance requirements for acceptance of the data.

1.9 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.10 *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

- C92 Test Methods for Sieve Analysis and Water Content of Refractory Materials
- C169 Test Methods for Chemical Analysis of Soda-Lime and Borosilicate Glass
- C429 Test Method for Sieve Analysis of Raw Materials for Glass Manufacture
- C693 Test Method for Density of Glass by Buoyancy
- 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
- C1220 Test Method for Static Leaching of Monolithic Waste Forms for Disposal of Radioactive Waste
- C1285 Test Methods for Determining Chemical Durability of Nuclear, Hazardous, and Mixed Waste Glasses and Multiphase Glass Ceramics: The Product Consistency Test (PCT)
- D1129 Terminology Relating to Water
- D1193 Specification for Reagent Water
- D1293 Test Methods for pH of Water
- E691 Practice for Conducting an Interlaboratory Study to

¹ This practice is under the jurisdiction of ASTM Committee C26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.13 on Spent Fuel and High Level Waste.

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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.