Designation: C1752 – 11

Standard Guide for Measuring Physical and Rheological Properties of Radioactive Solutions, Slurries, and Sludges[1]

This standard is issued under the fixed designation C1752; 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 *Intent:*

1.1.1 The intent of this guide is to provide guidance for the measurement and calculation of physical and rheological properties of radioactive solutions, slurries, and sludges as well as simulants designed to model the properties of these radioactive materials.

1.2 *Applicability:*

1.2.1 This guide is intended for measurement of mass and volume of the solution, slurries, and sludges as well as dissolved solids content in the liquid fraction and solids content associated with the slurries and sludges. Particle size distribution is also measured.

1.2.2 This guide identifies the data required and the equations recommended for calculation of density (bulk, settled solids, supernatant, and centrifuged solids), settling rate, volume and weight percent of the centrifuged solids and settled solids, and the weight percent undissolved solids, dissolved solids, and total oxides.

1.2.3 This guide is intended for measurement of shear strength and shear stress as a function of shear rate.

1.2.4 Rheological property measurement guidelines in this guide are limited to rotational rheometers.

1.2.5 This guide is limited to measurements of viscous and incipient flow and does not include oscillatory rheometry.

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

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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C859 Terminology Relating to Nuclear Materials

C1751 Guide for Sampling Radioactive Tank Waste

D1193 Specification for Reagent Water

2.2 *Other Standards:*[3]

ISO13320-1 "Particle Size Analysis—Laser Diffraction Methods. Part 1: General Principles," International Organization for Standardization, Geneva, Switzerland (1999)

3. Terminology

3.1 *Definitions:*

3.1.1 *apparent viscosity, n*—measured shear stress divided by the measured shear rate.

3.1.2 *density, n*—in the United States, mass per unit volume.

3.1.3 *interstitial solution, n*—in this guide, interstitial solution is the solution contained between the suspended, settled, or centrifuged solid particles of a sludge sample.

3.1.4 *Newtonian fluid, n*—a fluid whose apparent viscosity is independent of shear rate.

3.1.5 *non-Newtonian fluid, n*—a fluid whose apparent viscosity varies with shear rate.

3.1.6 *rheogram, n*—plot of shear stress versus shear rate.

3.1.6.1 *Discussion*—A rheogram is also called a flow curve.

3.1.7 *shear rate, n*—in laminar flow, the velocity gradient perpendicular to the direction of shear flow in parallel adjacent layers of a fluid body under shear force.

3.1.8 *shear strength, n*—maximum stress measured during incipient motion.

3.1.9 *shear stress, n*—shear force per unit area.

[1] This test method 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.

Current edition approved Sept. 1, 2011. Published December 2011. DOI: 10.1520/C1752–11.

[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] *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, D. C. For suggestions on the testing of reagents not listed by the American Chemical Society see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U. K., and the United States Pharmacopeia and National Formulary, U. S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.

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