



Standard Practice for Sample Digestion of Soils for the Determination of Lead by Atomic Spectrometry¹

This standard is issued under the fixed designation E 1726; 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 practice covers drying, homogenization, and acid digestion of soil samples and associated quality control (QC) samples using a hot plate type method for the determination of lead using laboratory atomic spectrometry analysis techniques such as Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometry (FAAS), and Graphite Furnace Atomic Absorption Spectrometry (GFAAS).

1.2 This practice is based on U.S. EPA SW846 Method 3050.

1.3 This practice contains notes that are explanatory and are not part of the mandatory requirements of this standard.

1.4 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

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:

D 1193 Specification for Reagent Water²

2.2 U.S. Government Analytical Method:

U.S. EPA SW 846 Test Methods for Evaluating Solid Waste Physical/Chemical Methods³

3. Terminology

3.1 Definitions:

3.1.1 *batch*—a group of field or quality control (QC) samples that are processed together using the same reagents and equipment.

3.1.2 *digestate*—an acidified aqueous solution that results from digestion of the sample.

3.1.3 *digestion*—the sample preparation process that will

solubilize (extract) targeted analytes present in the sample and results in an acidified aqueous solution called the digestate.

3.1.4 *duplicate sample*—a second portion of a homogenized sample carried through sample digestion. Analysis results for these samples are used to provide information on the precision of the homogenization process.

3.1.5 *extraction*—the dissolution of target analytes from a solid matrix into a liquid form. During sample digestion, target analytes are extracted (solubilized) into an acid solution.

3.1.6 *non-spiked sample*—a portion of a homogenized sample that is targeted for addition of analyte but that is not fortified (spiked) with all the lead before sample preparation. Analysis results for this sample are used to correct for background levels in soil that are used for the spiked and spiked duplicate samples.

3.1.7 *reagent blank*—a digestate that reflects the maximum treatment given any one sample within a batch of samples, except that it has no sample initially placed into the digestion vessel. (The same reagents and processing conditions which are applied to field samples within a batch are also applied to the reagent blank.) Analysis results from reagent blanks provide information on the level of potential contamination experienced by samples processed within the batch.

3.1.8 *reference material*—a material of known composition where the lead level is certified by the manufacturer.

3.1.9 *spiked sample and spiked duplicate sample*—each is a portion of a single homogenized sample to which the same known amount of analyte is added (spiked) before sample digestion. Analysis results for these samples are used to provide information on accuracy and precision of the overall analysis process.

4. Summary of Practice

4.1 A representative soil sample is dried and homogenized, and then digested (in a batch mode with other samples) on a hot plate using nitric acid and hydrogen peroxide. The digestate is diluted for final volume prior to lead measurement.

5. Significance and Use

5.1 There is a need to monitor the lead content in paint in buildings and related structures in order to determine the potential lead hazard. Hence, effective and efficient methods are required for the preparation of soil samples for determination of their lead content.

¹ This practice is under the jurisdiction of ASTM Committee E-6 on Performance of Buildings and is the direct responsibility of Subcommittee E06.23 on Lead Paint Abatement.

Current edition approved Aug. 15, 1995. Published October 1995.

² *Annual Book of ASTM Standards*, Vol 11.01.

³ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.