



Standard Test Method for Graphite Furnace Atomic Absorption Spectrometric Determination of Lead and Cadmium Extracted from Ceramic Foodware¹

This standard is issued under the fixed designation C1466; 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 procedures for using graphite furnace atomic absorption spectroscopy (GFAAS) to quantitatively determine lead and cadmium extracted by acetic acid at room temperature from the food-contact surface of foodware. The method is applicable to food-contact surfaces composed of silicate-based materials (earthenware, glazed ceramicware, decorated ceramicware, decorated glass, and lead crystal glass) and is capable of determining lead concentrations greater than 0.005 to 0.020 $\mu\text{g/mL}$ and cadmium concentrations greater than 0.0005 to 0.002 $\mu\text{g/mL}$, depending on instrument design.

1.2 This test method also describes quality control procedures to check for contamination and matrix interference during GFAAS analyses and a specific sequence of analytical measurements that demonstrates proper instrument operation during the time period in which sample solutions are analyzed.

1.3 Cleaning and other contamination control procedures are described in this test method. Users may modify contamination control procedures provided that the modifications produce acceptable results and are used for both sample and quality control analyses.

1.4 The values stated in SI (metric) units are to be regarded as the standard. The values 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*:²

C738 Test Method for Lead and Cadmium Extracted from Glazed Ceramic Surfaces

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *calibration solutions*—4 % acetic acid solutions containing known amounts of lead or cadmium which are used to calibrate the instrument.

3.1.2 *characteristic mass* (m_o —mass (picograms, pg) of lead or cadmium that produces instrument response (peak area) of 0.0044 integrated absorbance (absorbance-seconds, A-s). Characteristic mass is a measure of instrument sensitivity and is a function of instrument design, operating conditions, and analyte-matrix-graphite interactions. Characteristic mass is calculated from the volume of solution in the furnace and the slope of the calibration curve or the concentration that gives an instrument response in the middle of the working range (that is, approximately 0.100 or 0.200 A-s). Characteristic mass is compared to manufacturer specifications to verify that the instrument is optimized.

3.1.3 *check solutions*—4 % acetic acid solutions containing known amounts of lead or cadmium which are analyzed in the same time period and subjected to the same analytical conditions and calibration curve as sample solutions. Check solutions are analyzed to verify that carry-over did not occur and the instrument was operating correctly during the time period in which sample solutions were analyzed. Portions of calibration solutions analyzed as unknown test solutions (as opposed to analysis for calibrating the instrument) are used for this purpose.

¹ This test method is under the jurisdiction of ASTM Committee C21 on Ceramic Whitewares and Related Products and is the direct responsibility of Subcommittee C21.03 on Methods for Whitewares and Environmental Concerns.

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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.