



Designation: C 738 – 94 (Reapproved 1999)

## Standard Test Method for Lead and Cadmium Extracted from Glazed Ceramic Surfaces<sup>1</sup>

This standard is issued under the fixed designation C 738; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the precise determination of lead and cadmium extracted by acetic acid from glazed ceramic surfaces. The procedure of extraction may be expected to accelerate the release of lead from the glaze and to serve, therefore, as a severe test that is unlikely to be matched under the actual conditions of usage of such ceramic ware. This test method is specific for lead and cadmium.

1.2 The values stated in SI (metric) units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *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. Summary of Test Method

2.1 Lead and cadmium are extracted from the test article by leaching with 4 % acetic acid for 24 h at 20 to 24°C (68 to 75°F) and are measured by flame atomic absorption spectroscopy.

### 3. Interferences

3.1 There are no interferences when instrumental background correction and light sources specific for lead and cadmium are used.

### 4. Apparatus

4.1 *Atomic Absorption Spectrometer* equipped with light sources (hollow cathode or electrodeless discharge lamps) specific for lead and cadmium, instrumental background correction, and a 4-in. (102-mm) single slot or Boling burner head. Digital concentration readout may be used. Use air-acetylene flame, instrumental background correction, and operating con-

ditions recommended by instrument manufacturer. Using these conditions, characteristic concentration (concentration that gives 0.0044 absorbance) should be approximately ( $\pm 20$  %) 0.2 and 0.45 ppm for Pb measured at 217.0 and 283.3 nm, respectively. Characteristic concentration should be approximately ( $\pm 20$  %) 0.02 ppm for Cd.

NOTE 1—1 ppm = 1  $\mu\text{g/mL}$ .

4.2 *Lead Lamp*, set at 283.3 or 217.0 nm.

4.3 *Cadmium Lamp*, set at 228.8 nm.

4.4 *Glassware* of chemically resistant borosilicate glass, to make reagents and solutions. Clean by rinsing with dilute nitric acid (10 % by volume) followed by copious quantities of water.

### 5. Reagents

5.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.<sup>2</sup> Other grades may be used provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean distilled water.

5.3 *Acetic Acid (4 % by Volume)*—Mix 1 volume of glacial acetic acid with 24 volumes of water.

5.4 *Detergent Wash*—Use detergent designed for washing household dishes by hand. Mix with lukewarm tap water according to product instructions.

5.5 *Lead Nitrate Solution (1000-ppm Pb)*—Dissolve 1.598 g of lead nitrate ( $\text{Pb}(\text{NO}_3)_2$ ) in 4 % acetic acid and dilute to 1 L with 4 % acetic acid. Commercially available standard lead solutions may also be used.

5.6 *Hydrochloric Acid (1 % by weight)*—Mix 1 volume of concentrated hydrochloric acid (HCl, sp gr 1.19) with 37 volumes of water.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee C-21 on Ceramic Whitewares and Related Products and is the direct responsibility of Subcommittee C21.03 on Test Methods for Whiteware Properties. This test method was developed jointly by the AOAC and ASTM, and adopted official final action by the Association of Official Analytical Chemists (method 973.32 *AOAC Official Methods of Analysis* (1990) 15th ed, AOAC International, Arlington, VA.

Current edition approved July 15, 1994. Published September 1994. Originally published as C 738 – 72. Last previous edition C 738 – 94.

<sup>2</sup> *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. 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.