



Designation: C 1034 – 85 (Reapproved 1995)

Standard Test Method for Lead and Cadmium Extracted From Glazed Ceramic Cookware¹

This standard is issued under the fixed designation C 1034; 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 the precise determination of lead and cadmium extracted by acetic acid from glazed ceramic surfaces under boiling conditions. The procedure of extraction may be expected to accelerate the release of lead and cadmium from the glaze and to serve, therefore, as a severe test that simulates the most severe conditions of usage of such ceramic cookware. This method is specific for lead and cadmium.

1.2 This test method is applicable to ceramic cookware intended for use in contact with food, for example cookware made of china, crockery, porcelain, and earthenware.

1.3 *This standard does not purport to address 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:

C 242 Terminology of Ceramic Whitewares and Related Products²

D 1193 Specification for Reagent Water³

E 438 Specification for Glasses in Laboratory Apparatus⁴

E 694 Specification for Volumetric Ware⁴

2.2 ISO Standard:

3585 Glass Plate Pipeline and Fittings—Properties of Borosilicate Glass 3.3⁵

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *cookware*—ceramic articles including those intended to be heated in the preparation of foodstuffs, for example, china, crockery, porcelain, and earthenware; excluding items not specifically designed for cooking, such as cups, plates, and

soup bowls, which may be occasionally used to warm foods in a microwave oven.

3.2 *Definitions*—For definitions of terms used in this test method, see Terminology C 242.

4. Summary of Method

4.1 The lead and cadmium extracted from cookware, by boiling acetic acid after 2 h of leaching, are measured by atomic absorption spectrophotometry using specific hollow cathode lamps for lead and cadmium respectively.

5. Significance and Use

5.1 The consequences of lead and cadmium release from cookware require effective means of control to ensure the protection of the population against a possible health hazard.⁶ This potential arises with improperly formulated, applied and fired glazes and decorations. There is a particular concern for cookware because the normal conditions of use (heating acid foods for prolonged periods) are conducive to extracting the soluble lead and cadmium into the food. Therefore, this test method deals specifically with ceramic cookware intended to be used for the preparation of foods by heating.

6. Interferences

6.1 Since specific hollow cathode lamps for lead and cadmium are used, there are no interferences.

7. Apparatus

7.1 *Atomic Absorption Spectrophotometer*, equipped with a 4-in. (102-mm) single slot or Belling burner head and digital concentration readout attachment (DCR) if available.⁷ This instrument should have a sensitivity of about 0.5 ppm of lead for 1 % absorption and a sensitivity of about 0.05 ppm of cadmium for 1 % absorption. Use the operating conditions as specified in the instrument manufacturer's analytical methods manual.

¹ 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 Fundamental Properties.

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² *Annual Book of ASTM Standards*, Vol 15.02.

³ *Annual Book of ASTM Standards*, Vol 11.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁶ *Proceedings, International Conference on Ceramic Foodware Safety*, Lead Industries, Inc., 1975, pp. 8–17.

WHO Food Additives Series, No. 4, World Health Organization, 1972.

“Ceramic Foodware Safety, Sampling, Analysis and Results for Release,” Report of a WHO Meeting, Geneva, Switzerland June 8–10, 1976, *WHO/Food Additives 77.44* World Health Organization, 1977.

⁷ Perkin-Elmer models 303 and 403 and Jarrell-Ash model 82-546 have been found suitable for this determination.