



Standard Test Method for Lead and Cadmium Extracted from the Lip and Rim Area of Glass Tumblers Externally Decorated with Ceramic Glass Enamels¹

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1. Scope

1.1 This test method covers the determination of lead and cadmium extracted by acetic acid from the lip and rim area of glassware used for drinking and which is exteriorly decorated with ceramic glass enamels. The procedure of extraction may be expected to accelerate the release of lead and cadmium from the decorated area and to serve, therefore, as a severe test that is unlikely to be matched under the actual conditions of usage of such glassware. This test method is specific for lead and cadmium.

NOTE 1—For additional information see Test Method C 738.

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

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns 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 738 Test Method for Lead and Cadmium Extracted from Glazed Ceramic Surfaces²

3. Terminology

3.1 Definitions:

3.1.1 *ceramic glass decorations*—ceramic glass enamels fused to glassware at temperatures above 425°C (800°F) to produce a decoration.

3.1.2 *ceramic glass enamels (also ceramic enamels or glass enamels)*—predominately colored, silicate glass fluxes used to decorate glassware.

¹ This test method is under the jurisdiction of ASTM Committee C-14 on Glass and Glass Products and is the direct responsibility of Subcommittee C14.10 on Glass Decoration. It was developed jointly by ASTM Committee C-14 and C-21 on Ceramic Whitewares and Related Products, the Society of Glass Decorators A-20 Subcommittee on Ceramic Enamelled Decorated Glass Tumblers, and an Interagency Task Force consisting of FDA, EPA, and CPSC of the U.S. Government.

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

3.1.3 *lip and rim area*—that part of a drinking vessel which extends 20 mm below the rim on the outside of the specimen.

4. Summary of Test Method

4.1 Lead and cadmium are extracted from the lip and rim area of the article under test by leaching with a 4 % acetic acid solution at 20 to 24°C (68 to 75°F) for 24 h and are measured by atomic absorption spectrophotometry using specific hollow cathode or electrodeless discharge lamps for lead and cadmium respectively. Results are reported as micrograms per millilitre (ppm) extracted relative to the internal volume of the glass article.

5. Significance and Use

5.1 The heavy metals, lead and cadmium, are known to cause serious health effects in man if consumed in excess. It is, therefore, important to measure the amount that may be extracted from an area of the glass drinking vessel in contact with the lip. Even though the amount of lead and cadmium extracted by this test method is in no way representative of the amount of the metals extracted by actual lip contact, the relative magnitude of metals extracted from one test specimen in relation to another test specimen provides an effective tool for discrimination.

6. Interferences

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

7. Apparatus

7.1 *Atomic Absorption Spectrophotometer (AAS)*, equipped with a 102-mm (4-in.) single slot or Boling burner head and digital concentration readout attachment (DCR) if available. This instrument should have a sensitivity of about 0.5 µg/mL of lead for 1 % absorption and a sensitivity of about 0.025 µg/mL of cadmium for 1 % absorption. Use the operating conditions as specified in the instrument manufacturer's analytical methods manual.

7.2 *Hollow Cathode or Electrodeless Discharge Lead Lamp*, set at 283.3 nm.

7.3 *Hollow Cathode or Electrodeless Discharge Cadmium Lamp*, set at 228.8 nm.