



Standard Test Method for Identification and Quantification of Chromium, Bromine, Cadmium, Mercury, and Lead in Polymeric Material Using Energy Dispersive X-ray Spectrometry¹

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1. Scope

1.1 This test method describes an energy dispersive X-ray fluorescence (EDXRF) spectrometric procedure for identification and quantification of chromium, bromine, cadmium, mercury, and lead in polymeric materials.

1.2 This test method is not applicable to determine total concentrations of polybrominated biphenyls (PBB), polybrominated diphenyl ethers (PBDE) or hexavalent chromium. This test method cannot be used to determine the valence states of atoms or ions.

1.3 This test method is applicable for a range from 20 mg/kg to approximately 1 wt % for chromium, bromine, cadmium, mercury, and lead in polymeric materials.

1.4 This test method is applicable for homogeneous polymeric material.

1.5 The values stated in SI units are to be regarded as the standard. Values given in parentheses are for information only.

1.6 This test method is not applicable to quantitative determinations for specimens with one or more surface coatings present on the analyzed surface; however, qualitative information may be obtained. In addition, specimens less than infinitely thick for the measured X rays, must not be coated on the reverse side or mounted on a substrate.

1.7 *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.*

¹ This test method is under the jurisdiction of ASTM Committee F40 on Declarable Substances in Materials and is the direct responsibility of Subcommittee F40.01 on Test Methods.

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2. Referenced Documents

2.1 ASTM Standards:²

- D883 Terminology Relating to Plastics
- D3641 Practice for Injection Molding Test Specimens of Thermoplastic Molding and Extrusion Materials
- D4703 Practice for Compression Molding Thermoplastic Materials into Test Specimens, Plaques, or Sheets
- D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials
- E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods
- E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method
- E1361 Guide for Correction of Inter-element Effects in X-Ray Spectrometric Analysis
- F2576 Terminology Relating to Declarable Substances in Materials

3. Terminology

3.1 Definitions:

3.1.1 Definitions of terms applying to XRF, plastics and declarable substances appear in Terminology E135, Terminology D883 and Terminology F2576, respectively.

3.1.2 *Compton scatter*—the inelastic scattering of an X-ray photon through its interaction with the bound electrons of an atom; this process is also referred to as incoherent scatter.

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.