



Designation: D6247 – 18

Standard Test Method for Determination of Elemental Content of Polyolefins by Wavelength Dispersive X-ray Fluorescence Spectrometry¹

This standard is issued under the fixed designation D6247; 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 a general procedure for the determination of elemental content in polyolefins by wavelength-dispersive X-ray fluorescence (WDXRF) spectrometry, in mass fraction ranges typical of those contributed by additives, catalysts, and reactor processes. The elements covered by this test method include fluorine, sodium, magnesium, aluminum, silicon, phosphorus, sulfur, calcium, titanium, chromium, and zinc in the composition ranges given in [Table 1](#).

TABLE 1 Mass Fraction Ranges for Additive and Trace Elements in Polyolefins

Element	Lower Limit (mg/kg)	Upper Limit (mg/kg)
Fluorine	100	300
Sodium	25	200
Magnesium	10	600
Aluminum	40	500
Silicon	30	1000
Phosphorus	5	200
Sulfur	20	200
Calcium	10	300
Titanium	5	200
Chromium	5	100
Zinc	10	1000

1.1.1 This test method does not apply to polymers specifically formulated to contain flame retardants including brominated compounds and antimony trioxide.

1.1.2 This test method does not apply to polymers formulated to contain high levels of compounds of vanadium, molybdenum, cadmium, tin, barium, lead, and mercury because the performance can be strongly influenced by spectral interferences or interelement effects due to these elements.

NOTE 1—Specific methods and capabilities of users may vary with differences in interelement effects and sensitivities, instrumentation and applications software, and practices between laboratories. Development and use of test procedures to measure particular elements, mass fraction ranges or matrices is the responsibility of individual users.

NOTE 2—One general method is outlined herein; alternative analytical practices can be followed, and are attached in notes, where appropriate.

1.2 The values stated in SI units are to be regarded as the standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use. Specific precautionary statements are given in Section 10.*

NOTE 3—There is no known ISO equivalent to this standard.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- [C1118](#) Guide for Selecting Components for Wavelength-Dispersive X-Ray Fluorescence (XRF) Systems (Withdrawn 2011)³
- [D883](#) Terminology Relating to Plastics
- [D4703](#) Practice for Compression Molding Thermoplastic Materials into Test Specimens, Plaques, or Sheets
- [D6247](#) Test Method for Determination of Elemental Content of Polyolefins by Wavelength Dispersive X-ray Fluorescence Spectrometry
- [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
- [E1361](#) Guide for Correction of Interelement Effects in X-Ray Spectrometric Analysis
- [E1601](#) Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.70 on Analytical Methods.

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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.

³ The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard