



Standard Test Method for Determination of Butylated Hydroxy Toluene (BHT) in Polymers of Ethylene and Ethylene–Vinyl Acetate (EVA) Copolymers By Gas Chromatography¹

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1. Scope

1.1 This test method describes a procedure for the determination of butylated hydroxy toluene (BHT) (2,6-di-*t*-butyl-4-methyl-hydroxybenzene) in polymers of ethylene and ethylene-vinyl acetate (EVA) copolymers by solvent extraction followed by gas chromatographic analysis. Detection of the compound is achieved by flame ionization, and quantitative analysis is obtained by use of internal or external standards, as described in Practices E 260, E 355, and E 594.

1.2 The values stated in SI 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.* Specific precautionary statements are given in Section 9.

NOTE 1—There is no similar or equivalent ISO standard.

2. Referenced Documents

2.1 ASTM Standards:

D 4968 Guide for Annual Review of Test Methods and Specifications for Plastics²

E 260 Practice for Packed Column Gas Chromatography²

E 355 Practice for Gas Chromatography Terms and Relationships³

E 380 Practice for Use of the International System of Units (SI) (the Modernized Metric System)⁴

E 594 Practice for Testing Flame Ionization Detectors Used in Gas Chromatography³

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method³

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/ (D20.70.02) Chromatography.

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² Annual Book of ASTM Standards, Vol 08.03.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ Discontinued; see 1997 Annual Book of ASTM Standards, Vol 14.02.

3. Terminology

3.1 Definitions—Units and symbols used in this test method are those recommended in Practice E 380. Chromatographic terms and relationships are as described in Practice E 355.

3.2 *Abbreviations:* Abbreviations:

3.2.1 *BHT*—Butylated hydroxy toluene (2,6-di-*tert*-butyl-4-methyl-hydroxybenzene).

3.2.2 *MM*—Methyl myristate.

3.2.3 *EVA*—Ethylene-vinyl acetate copolymers.

3.2.4 *LDPE*—Low-density polyethylene.

3.2.5 *HDPE*—High-density polyethylene.

4. Summary of Test Method

4.1 The BHT from a finely ground polymer sample is extracted by shaking or refluxing with cyclohexane or isopropanol that may contain an internal standard. A known volume of this extract is injected into a gas chromatographic column packed with a liquid-coated solid support. Passing through this column in a stream of carrier gas, BHT is separated from the extraction solvent and other components. Responses of BHT and any internal standard are measured by a flame ionization detector. This signal is recorded to indicate the relative concentration and retention time of BHT.

5. Significance and Use

5.1 Separation and identification of stabilizers used in the manufacture of polyethylene are necessary in order to correlate performance properties with polymer composition.

5.2 The BHT extraction procedure is made effective by the insolubility of the polymer sample in solvents generally used for gas chromatographic analysis.

6. Interferences

6.1 Any material eluting at or near the BHT or MM retention times will cause erroneous results. Prior to extraction, solvent blanks should be analyzed to confirm the absence of interfering peaks.