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.

Designation: D4937 – 96 (Reapproved 2021)

Standard Test Method for *p*-Phenylenediamine Antidegradants Purity by Gas Chromatography[1]

This standard is issued under the fixed designation D4937; 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 determination of the purity of Class I, II, and III *p*-phenylenediamine (PPD) antidegradants as described in Classification D4676 by gas chromatography (GC) detection and area normalization for data reduction.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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]

D3853 Terminology Relating to Rubber and Rubber Latices—Abbreviations for Chemicals Used in Compounding

D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

D4676 Classification for Rubber Compounding Materials—Antidegradants

E260 Practice for Packed Column Gas Chromatography

2.2 *ISO Standard:*[3]

ISO 6472 Rubber Compounding Ingredients—Abbreviations

3. Terminology

3.1 *Definitions:*

3.1.1 *area normalization, n*—a method of calculating the percent composition by measuring the area of each observed peak and dividing each peak area by the total area. This assumes that all peaks are eluted and that each component has the same detector response.

3.1.2 *lot sample, n*—a production sample representative of a standard production unit, normally referred to as the sample.

3.1.3 *specimen, n*—the actual material used in the analysis. It must be representative of the lot sample.

3.2 *Abbreviations*—The following abbreviations are in accordance with Terminology D3853 and ISO 6472:

3.2.1 77PD—*N,N'*bis-(1,4-dimethylpentyl)-*p*-phenylenediamine.

3.2.2 DTPD—*N,N'*-ditolyl-*p*-phenylenediamine.

3.2.3 IPPD—*N*-isopropyl-*N'*-phenyl-*p*-phenylenediamine.

3.2.4 PPD—*p*-phenylenediamine.

3.2.5 6PPD—*N*-(1,3 dimethylbutyl)-*N'*-phenyl-*p*-phenylenediamine.

4. Summary of Test Method

4.1 The analysis is performed by temperature programmed GC utilizing either a packed column (Procedure A) or a capillary column (Procedure B). Quantification is achieved by area normalization using a peak integrator or laboratory data system.

5. Significance and Use

5.1 This test method is designed to assess the relative purity of production PPDs. These additives are primarily used as antiozonants for tires and other rubber or polymeric products.

5.2 Since the results of this test method are based on area normalization, it assumes that all components are eluted from

[1] This test method is under the jurisdiction of ASTM Committee D11 on Rubber and Rubber-like Materials and is the direct responsibility of Subcommittee D11.11 on Chemical Analysis.

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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] Available from the American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

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