



Standard Test Method for Rubber Chemicals—Benzothiazyl Disulfide (MBTS)—Assay¹

This standard is issued under the fixed designation D 5051; 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 describes the determination of assay of benzothiazyl disulfide (MBTS). It is based on a titration of free iodine liberated upon reduction of MBTS, with potassium iodide (KI) in acid medium.

1.2 The assay is determined as mass percent.

1.3 Free 2-mercaptobenzothiazole (MBT) content is not determined.

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

1.5 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water²

D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries³

3. Summary of Test Method

3.1 In an acid medium, MBTS is reduced with KI to MBT and free iodine. The free iodine is titrated with standard sodium thiosulfate solution.

3.2 MBTS is sparingly soluble in any organic solvent; while MBT, formed during the reaction of MBTS with KI is very soluble. Therefore after reagents are added as indicated in the procedure, continue to stir till all MBTS has reacted.

4. Significance and Use

4.1 The test method is designed to assess the purity of MBTS, which is used for rubber and latex vulcanization acceleration. The amount of MBTS is of importance in predicting performance in rubber compounds and for raw material purchase and control.

4.2 This test method may be used as a quality control tool

and for research and development work.

5. Interferences

5.1 KI-reducible contaminants interfere with the results.

6. Apparatus

6.1 *Erlenmeyer Flask*, 300 cm³.

6.2 *Graduated Cylinder*, 5 cm³.

6.3 *Magnetic Stirrer*, with hot plate.

6.4 *Buret*, 50-cm³ capacity.

6.5 *Analytical Balance*, having a sensitivity of ± 0.1 mg.

7. Reagents and Materials

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.⁴ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

7.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean reagent water as defined by Types I, II, or III of Specification D 1193.

7.3 *Acetic Acid*, 100 %, analytical reagent.

7.4 *Isopropanol*, analytical reagent.

7.5 *Toluene*, analytical reagent.

7.6 *Potassium Iodide* (KI), analytical reagent.

7.7 *Sodium Thiosulfate*—($\text{Na}_2\text{S}_2\text{O}_3$) (0.1 N).

7.8 *Starch Indicator Solution*—Slurry 2 g of soluble starch with 10 cm³ of water and dilute with 90 cm³ of boiling water.

7.9 *Hydrochloric Acid* (HCl) (2 N).

7.10 *Solvent*: Mix 5 volumes isopropanol with 3 volumes toluene.

8. Sampling

8.1 Depending upon the purposes of the testing, sampling shall be at the discretion of the analyst to obtain as representative a sample as possible of the lot to be tested.

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

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 09.01.

⁴ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmaceutical Convention, Inc. (USPC), Rockville, MD.