



Standard Test Method for Rubber Chemicals—2-Mercaptobenzothiazole (MBT)—Assay¹

This standard is issued under the fixed designation D 1991; 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 procedure for the assay of 2-mercaptobenzothiazole (MBT). It is based on a potentiometric titration of MBT with sodium hydroxide.

1.2 The assay is determined as percent by mass.

1.3 The values given in SI units are to be regarded as standard.

1.4 *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 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries²

3. Summary of Test Method

3.1 A sample of MBT is dissolved in ethanol. The solution is titrated potentiometrically using a solution of sodium hydroxide as the titrant.

4. Significance and Use

4.1 MBT is commonly used as an accelerator for rubber and latex vulcanization. The purity of MBT may be of importance in predicting performance in rubber compounds and this test method is designed to assess the purity of MBT.

4.2 This test method may be used as a quality control tool and for research and development work.

5. Apparatus

5.1 *Erlenmeyer Flask*, 250-cm³.

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

5.3 *Potentiograph*.

5.4 *Glass pH Electrode*, and reference electrode.

5.5 *Graduated Cylinder*, 200-cm³.

6. Reagents

6.1 *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.³

6.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean distilled water or water of equal purity.

6.3 *Aqueous Sodium Hydroxide Solution* (40 g NaOH in 1 dm³ of solution)—Standardize by accepted analytical techniques to ensure that the maximum error of the normalization factor is not more than 0.001.

6.4 *Ethanol*, denatured with toluene (in the ratio of 100 volumes ethanol to 1 volume toluene).

6.5 *Toluene*.

7. Sampling

7.1 Sampling shall be at the discretion of the analyst to obtain as representative a sample as possible, of the lot to be tested.

8. Procedure

8.1 Weigh (to nearest 0.001 g) about 5 g of the specimen, and transfer into a 250-cm³ Erlenmeyer flask. Using a graduated cylinder, add 125 cm³ denatured ethanol (6.4). Titrate the solution potentiometrically, using a glass electrode system, with NaOH (6.3) as the titrant (A) (see Fig. 1).

9. Calculation

9.1 From the plot of pH versus millilitres of NaOH, as illustrated in Fig. 1, the equivalence point for the potentiometric titration is defined as the point of maximum slope.

9.1.1 This point is identified as follows: Draw a tangent through the steepest part of the curve. Determine the two points at which the curve departs from this tangent line. The midpoint

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 09.01.

³ *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. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.