



Designation: E 611 – 03

Standard Test Methods for Low Concentrations of Diethylene Glycol in Ethylene Glycol by Gas Chromatography¹

This standard is issued under the fixed designation E 611; 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 These test methods are intended primarily for the analysis of mixtures of ethylene and diethylene glycols in which the diethylene glycol concentration is 0.1 % or less. Both test methods should be applicable to higher concentrations of diethylene glycol, but precision and bias estimates have been obtained only for 0.05 to 0.1 % diethylene glycol.

NOTE 1—Test Methods E 202 describe another gas chromatographic test method applicable to mixtures of ethylene, diethylene, and triethylene glycols and mixtures of propylene, dipropylene, and tripropylene glycols in which one of the glycols is the principal component and the other two are present in concentrations of 0.1 to 1 % each.

1.2 The two test methods are given as follows:

	Sections
Test Method A—Nonderivative Method	5 to 13
Test Method B—Derivative Method	14 to 22

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.* For a specific warning statement, see 15.1.5.

2. Referenced Documents

2.1 *ASTM Standards:*²

D 1193 Specification for Reagent Water

E 180 Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial Chemicals

E 202 Test Methods for Analysis of Ethylene Glycols and Propylene Glycols

3. Significance and Use

3.1 Either test method may be used to determine the concentrations of diethylene glycol in ethylene glycol. The

concentrations of the components are obtained by a normalization technique, based on the assumption that all components are eluted under the conditions used. If all components should not be eluted, the calculated concentrations will be erroneously high, with the major component showing the most significant absolute error. Since water is not detected by these procedures, the results are on a water-free basis. Water may be determined in accordance with the applicable sections of Test Methods E 202 and the gas chromatographic results corrected for the water concentration.

3.2 Both test methods are currently in industrial use. Test Method A is the simpler of the two test methods because it does not require the preparation of derivatives prior to gas chromatographic analysis. The results obtained by Test Method A are slightly more accurate than those obtained by Test Method B. With respect to precision there is no significant difference between the two test methods. Test Method B has been reported to be suitable also for the analysis of a wide variety of glycol ethers, but this use is beyond the scope of this standard.

4. Purity of Reagents

4.1 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 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.

4.2 Unless otherwise indicated, references to water shall be understood to mean Type II or III reagent water conforming to Specification D 1193.

TEST METHOD A—NONDERIVATIVE METHOD

5. Summary of Test Method

5.1 The sample is injected into a gas chromatographic column. The components are separated as they pass through

¹ These test methods are under the jurisdiction of ASTM Committee E15 on Industrial and Specialty Chemicals and are the direct responsibility of Subcommittee E15.01 on General Standards.

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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 *Reagent Chemicals, American Chemical Society Specifications*, Am. Chemical Soc., 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.