



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

This standard is issued under the fixed designation E611; 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.

^{ε1} NOTE—Editorial change was made in Subsection 1.3 in May 2016.

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 E202 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.

NOTE 2—Test Method E2409 describes another gas chromatographic test method for the determination of glycol impurities in mono-, di-, tri- and tetraethylene glycol (MEG, DEG, TEG and TeEG) in the range of 5 to 3000 µg/g.

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 Review the current Safety Data Sheets (SDS) for detailed information concerning toxicity, first aid procedures, and safety precautions for chemicals used in this standard.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard with the exception of foot-pound units for apparatus descriptions.

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.* For a specific warning statement, see 15.1.5.

2. Referenced Documents

2.1 ASTM Standards:²

D1193 Specification for Reagent Water

E180 Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial and Specialty Chemicals (Withdrawn 2009)³

E202 Test Methods for Analysis of Ethylene Glycols and Propylene Glycols

E2409 Test Method for Glycol Impurities in Mono-, Di-, Tri- and Tetraethylene Glycol and in Mono- and Dipropylene Glycol (Gas Chromatographic Method)

2.2 Other Document:

Manufacturers' instruction manuals of gas chromatograph

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 E202 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

¹ These test methods are under the jurisdiction of ASTM Committee D16 on Aromatic Hydrocarbons and Related Chemicals and are the direct responsibility of Subcommittee D16.16 on Industrial and Specialty Product Standards.

Current edition approved June 1, 2015. Published June 2015. Originally approved in 1977. Last previous edition approved in 2008 as E611 – 08. DOI: 10.1520/E0611-08R15E01.

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 The last approved version of this historical standard is referenced on www.astm.org.