



Standard Test Method for Aldehydes in Mono-, Di-, and Triethylene Glycol (using Spectrophotometry)¹

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1. Scope*

1.1 This test method describes the spectrophotometric determination of total aldehyde content in the range of 0.5 to 50 mg/kg (as acetaldehyde) or 0.3 to 35 mg/kg (as formaldehyde) in mono-, di-, and triethylene glycol (MEG, DEG and TEG). Alkoxyalcohols (hemiacetals), if present, are co-determined, whereas dialkoxyalkanes (acetals), if present, are not. The results provide a measure of the purity of the sample with respect to total aldehyde content.

1.2 Review the current Safety Data Sheets (SDS) for detailed information concerning toxicity, first aid procedures, and safety precautions for all materials used in this test method.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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:²

D1193 Specification for Reagent Water

D2194 Test Method for Concentration of Formaldehyde Solutions

D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance

E180 Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial and Spe-

cialty Chemicals (Withdrawn 2009)³

E275 Practice for Describing and Measuring Performance of Ultraviolet and Visible Spectrophotometers

E288 Specification for Laboratory Glass Volumetric Flasks

E300 Practice for Sampling Industrial Chemicals

E969 Specification for Glass Volumetric (Transfer) Pipets

2.2 Other Document:

Manufacturer's Instruction Manual of Spectrophotometer

3. Summary of Test Method

3.1 The total aldehyde content of the sample is determined spectrophotometrically. The aldehydes present are reacted with excess 3-methyl-2-benzothiazolinone hydrazone (MBTH) to form azines. An aqueous solution of iron (III) chloride is added, causing the oxidation of the excess MBTH to a reactive cation, which reacts with the previously formed azines producing bluish-green cations. Acetone or methanol is added to stop the oxidation reaction, to mask the excess MBTH and to obtain a clear solution. The absorbance of the test solution is measured spectrophotometrically at 635 nm. The amount of aldehyde present in the test solution is derived from a previously prepared calibration graph. The aldehyde content of the sample, expressed as either acetaldehyde or formaldehyde, is calculated from the data obtained.

4. Significance and Use

4.1 Knowledge of the total aldehyde content of monoethylene glycol is required to establish whether the product meets the requirements of its quality specifications.

5. Apparatus

5.1 *Spectrophotometer*, suitable for measurement at a wavelength of 635 nm, provided with cells with a pathlength of 10 mm.

NOTE 1—Further information on spectrophotometers can be obtained from Practice E275.

5.2 *Analytical Balance*, readable to 0.1 mg, calibrated. Recalibrate or verify at regular intervals.

¹ This test method is under the jurisdiction of ASTM Committee D16 on Aromatic Hydrocarbons and Related Chemicals and is the direct responsibility of Subcommittee D16.16 on Industrial and Specialty Product 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 The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard