



Standard Test Method for Ultraviolet Transmittance of Monoethylene Glycol (Ultraviolet Spectrophotometric Method)¹

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1. Scope

1.1 This test method covers a procedure for the determination of the transmittance of monoethylene glycol (1,2-ethanediol; MEG) at wavelengths in the region 220 to 350 nm. The results provide a measure of the purity of the sample with respect to ultraviolet absorbing compounds.

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

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.*

1.4 Review the current Material Safety Data Sheets (MSDS) for detailed information concerning toxicity, first aid procedures, and safety precautions.

2. Referenced Documents

2.1 ASTM Standards:

E 131 Terminology Relating To Molecular Spectroscopy²

E 169 Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis²

E 180 Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial Chemicals³

E 275 Practice for Describing and Measuring Performance of Ultra-violet, Visible and Near Infrared Spectrophotometers²

2.2 Other Document:

Manufacturer's Instruction Manual of Spectrophotometer

3. Summary of Test Method

3.1 The product is sampled in such a way as to avoid extraneous contamination and air contact. After sparging with nitrogen, the absorbance of the sample contained in a 50-mm

cell is measured against water at a series of wavelengths and the transmittance over a pathlength of 10 mm is calculated.

4. Significance and Use

4.1 Knowledge of the ultraviolet transmittance of monoethylene glycol is required to establish whether the product meets the requirements of its quality specifications.

4.2 Dissolved oxygen in organic solvents, such as MEG, forms complexes that shift the solvent absorption from the vacuum ultraviolet range into the measurable UV range (near 190 to 250 nm). Monoethylene glycol has a UV absorption peak at 180 nm. For MEG-oxygen complexes, this peak is shifted to a longer wavelength, thus increasing the absorability at 220 nm. However, this effect is not observed in water. There is no significant measurable effect due to dissolved oxygen in water that would require nitrogen sparging prior to using for collection of the reference spectrum.

5. Apparatus

5.1 *Ultraviolet Spectrophotometer*, double beam, suitable for measurement at wavelengths in the region 200 to 400 nm, having a spectral bandwidth of 2.0 nm or less at 220 nm, wavelength accuracy ± 0.5 nm or less at 220 nm, wavelength repeatability 0.3 nm or less at 220 nm and a photometric accuracy of $\pm 0.5\%$ T or less, in the transmittance region above 50 % T . Stray light shall be less than 0.1 % at 220 nm. The instrument shall be provided with matched fused silica cells with pathlengths of 50 ± 0.1 mm and 10 mm.

5.2 *Nitrogen Stripping Apparatus*, consisting of an oil-free pressure reducing valve to fit the nitrogen cylinder, a control valve, vinyl tubing and a disposable glass pipette to be inserted in a 25-mL volumetric flask. Components should be clean and free of ultraviolet contaminants. Avoid contacting the sample with any plastic material containing plasticizers. Plasticizers can leach out of the material and cause erroneous results. Replace the disposable pipette by a clean, new one after each sample handling. (See Section 9.)

5.3 *Bottles*, capacity at least 0.5-L, with lined, well-fitting cap. Use a fresh bottle for each determination.

5.4 Glassware:

5.4.1 *Volumetric Flask*, 25-mL.

¹ This test method is under the jurisdiction of ASTM Committee E15 on Industrial and Specialty Chemicals and is the direct responsibility of Subcommittee E15.02 on Product Standards.

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² *Annual Book of ASTM Standards*, Vol 03.06.

³ *Annual Book of ASTM Standards*, Vol 15.05.