Designation: E 1982 – 98 (Reapproved 2002)

Standard Practice for Open-Path Fourier Transform Infrared (OP/FT-IR) Monitoring of Gases and Vapors in Air[1]

This standard is issued under the fixed designation E 1982; 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 practice covers procedures for using active open-path Fourier transform infrared (OP/FT-IR) monitors to measure the concentrations of gases and vapors in air. Procedures for choosing the instrumental parameters, initially operating the instrument, addressing logistical concerns, making ancillary measurements, selecting the monitoring path, acquiring data, analyzing the data, and performing quality control on the data are given. Because the logistics and data quality objectives of each OP/FT-IR monitoring program will be unique, standardized procedures for measuring the concentrations of specific gases are not explicitly set forth in this practice. Instead, general procedures that are applicable to all IR-active gases and vapors are described. These procedures can be used to develop standard operating procedures for specific OP/FT-IR monitoring applications.

1.2 *This practice 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 practice to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 131 Terminology Relating to Molecular Spectroscopy[2]

E 168 Practices for General Techniques of Infrared Quantitative Analysis[2]

E 1421 Practice for Describing and Measuring Performance of Fourier Transform Infrared (FT-IR) Spectrometers: Level Zero and Level One Tests[2]

E 1655 Practices for Infrared, Multivariate, Quantitative Analysis[2]

E 1865 Guide for Open-Path Fourier Transform Infrared (OP/FT-IR) Monitoring of Gases and Vapors in Air[2]

2.2 *Other Documents:*

FT-1R Open-Path Monitoring Guidance Document[3]

Compendium Method TO-16–Long-Path Open-Path Fourier Transform Infrared Monitoring of Atmospheric Gases[4]

3. Terminology

3.1 For definitions of terms used in this practice relating to general molecular spectroscopy, refer to Terminology E 131.

3.2 For definitions of terms used in this practice relating to OP/FT-IR monitoring, refer to Guide E 1865.

3.3 For definitions of general terms relating to optical remote sensing, refer to the FT-IR Open Path Monitoring Guidance Document.

4. Significance and Use

4.1 An OP/FT-IR monitor can, in principle, measure the concentrations of all IR-active gases and vapors in the atmosphere. Detailed descriptions of OP/FT-IR systems and the fundamental aspects of their operation are given in Guide E 1865 and the FT-IR Open-Path Monitoring Guidance Document. A method for processing OP/FT-IR data to obtain the concentrations of gases over a long, open path is given in Compendium Method TO-16. Applications of OP/FT-IR systems include monitoring for gases and vapors in ambient air, along the perimeter of an industrial facility, at hazardous waste sites and landfills, in response to accidental chemical spills or releases, and in workplace environments.

5. Instrumental Parameters

5.1 Several instrumental parameters must be chosen before data are collected with an OP/FT-IR system. These parameters include the measurement time, spectral resolution, apodization function, and zero filling factor. In some cases, the choice of these parameters might be limited by the parameters used to

[1] This practice is under the jurisdiction of ASTM Committee E-13 on Molecular Spectroscopy and is the direct responsibility of Subcommittee E13.03 on Infrared Spectroscopy.

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

[3] EPA/600/R-96/040, National Technical Information Service Technology Administration, U.S. Department of Commerce, Springfield, VA 22161, NTIS Order No. PB96–1704771NZ.

[4] *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, 2nd Ed., EPA/625/R-96/010b, Center for Environmental Research Info., Office of Research & Development, U.S. Environmental Protection Agency, Cincinnati, OH 45268, Jan. 1997.

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